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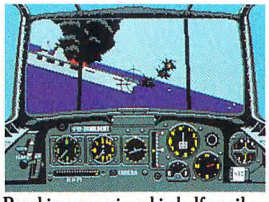
The technical detail and historical depth of *Battlehawks 1942* are bound to satisfy the most hard-core simulation buffs. Everything has been exhaustively researched, right down to the optimum airspeed and attack angle for dropping torpedoes.



Bombing a moving ship half a mile below, diving at 250 mph and dodging flak, can be a little tricky.

Your Wildcat's heavier armor and guns win in a shootout, but watch out if a Zero gets on your tail.

Flight characteristics and instruments are authentic. So are weapons and enemy tactics. About the only feature that isn't authentic is something combat pilots never dreamed of. An instant replay camera.

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We asked WWII pilots how to make *Battlehawks 1942* feel like the real thing. To a man, they said make it *intense*.

So instead of polygon-block graphics, we use high-resolution, digitally-rendered images. Ships and planes look almost photographic. Bombs and torpedoes explode in infernos of flames and smoke. The feeling, as one veteran pilot put it, is like flying into a beehive.

And that's where the science leaves off, and the fun starts.

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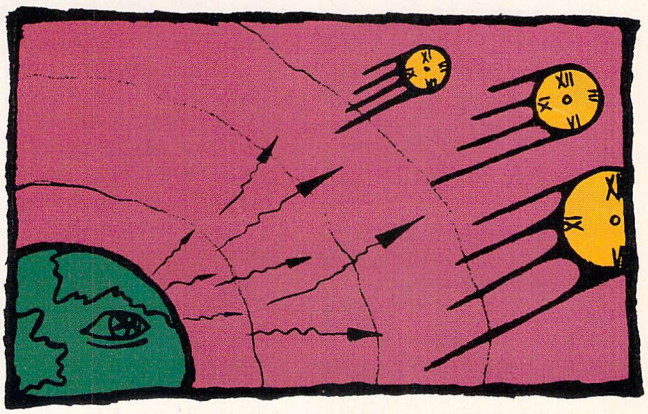

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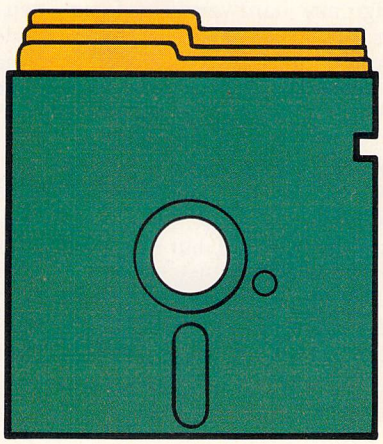

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THE EDITOR'S VIEW

The PC's relationship with game software has been a stormy one. The marriage began as a shotgun wedding with everyone just a little bit nervous, but the match has recently turned into true love—and therein lies a story.

When IBM introduced the PC in 1981, the Atari 800 was the king of the games machines. The PC wasn't designed to compete in the games market: It was intended as a *business* computer first and last. Most early PCs weren't even capable of graphics—essential for a games computer—and the machine's sound was severely limited.

In 1983, there were two important events: IBM rolled out the PCjr, a home version of its PC, and Commodore began shipping its 64, soon to win the hearts of game lovers away from Atari and become the most popular games computer in history (at least, history up to that point).

The PCjr never really caught on. Its sound and graphics were an improvement over the PC's, but it was difficult to expand and its infamous keyboard turned out to be an expensive fiasco for IBM. IBM quietly withdrew the jr shortly after its introduction. By that time, gamers were buying Ataris by the thousands and Commodore 64s by the *millions*.

But latent in the PC's original design were the seeds of game greatness. First, the machine was built with an open architecture, which meant that for better peripherals (like the enhanced graphics systems necessary for games), all that was needed was for someone to design new hardware. Third-party vendors, led by IBM itself, started a parade of graphics enhancements that included CGA, Hercules, EGA, MCGA, and VGA.

The other important aspect of the PC's design was that it was easy to copy. Compatibles began to appear, and competition pushed prices steadily downward. PCs were still primarily business machines, but more and more were finding their way into homes.

When prices fell to the thousand-dollar mark, the dam broke and PCs flooded into homes everywhere. By the beginning of 1988, there were millions of home users with PCs—PCs with good graphics. And these users wanted their computers for more than just business and personal productivity: They wanted to play games on them, too.

With this massive home base of PCs, publishers have started developing games specifically for the PC, and they're starting to roll out the PC versions of their hot titles first. We'll see hundreds of new PC games in the second half of 1989, and we can look forward to even more in 1990.

Here at *COMPUTE!'s PC Magazine*, we're excited that the PC-games story is unfolding with such success, and we're celebrating it the best way we know how—with a brand-new column devoted entirely to PC games. "Game Room," written by veteran journalist Harry Bee, will brighten each issue with an expert's insight into the world of PC games.

The PC's coming of age as a games machine isn't the only news in this issue. We're marking another important milestone: *COMPUTE!'s PC Magazine* is growing. In case you haven't noticed already, the issue you hold in your hands is bigger than any previous one—a full 16 pages bigger. Those 16 additional pages mean more features, more columns, and more reviews than ever before.

On the next issue's disk, you'll see another enhancement. Our recent "Readership Survey" and *PC Magazine* telephone polls indicated that you'd like larger, more powerful applications on the *PC* disk, even if that means a smaller number of programs. George Campbell, our "Best of the Boards" columnist, is working overtime to assemble a disk of major applications. If you liked our disk before, wait until next issue. Satisfaction guaranteed.

Clifton Karnes

Clifton Karnes
Associate Editor

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Greensboro: COMPUTE! Publications, Suite 200, 324 West Wendover Ave., Greensboro, NC 27408. Tel. (919) 275-9809. Kathleen Ingram.
New England & Mid-Atlantic: Bernard J. Theobald, Jr., (212) 315-1665; Peter Hardy (508) 681-9000; Kathleen Ingram (919) 275-9809.
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Editorial inquiries should be addressed to The Editor, COMPUTE!, Suite 200, 324 West Wendover Ave., Greensboro, NC 27408

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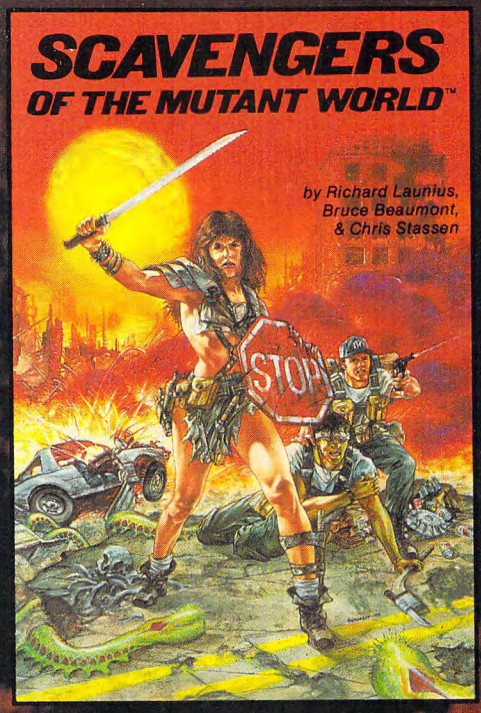

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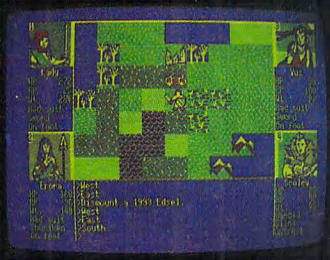

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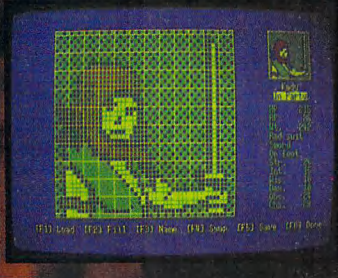

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Do you have a question about hardware or software? Or have you discovered something that could help other PC users? If so, we want to hear from you. Write to PC Feedback, COMPUTE!'s PC Magazine, *P.O. Box 5406, Greensboro, North Carolina 27403. We regret that we cannot provide personal replies to technical questions.*

Editor's note: Unsigned letters in this column are compilations of reader inquiries.

A Tale of Two Chips

What is the difference between an 8088 and an 8086 microprocessor?

Mark Villier
Rockwall, TX

In 1981, IBM introduced its first personal computer, the IBM PC. It used Intel's 8088 microprocessor (a descendant of the earlier 8080). The 8088 can address up to one megabyte of memory in 64K chunks, called segments. *It is a hybrid chip—although it handles data in 16-bit chunks, its external data bus is only 8 bits wide. Thus, to store a 16-bit number, it must write to memory twice.*

The 8086 is virtually identical to the 8088, with one important difference: It uses a 16-bit data bus. Software written for the 8088 is completely compatible with the 8086 but, because of the wider data path, executes faster.

"Arcade Volleyball" vs. DOS 2.1

COMPUTE!'s PC Magazine *is dedicated to bringing you the highest-quality programs available, including games that feature spectacular high-speed graphics.*

Creating beautiful graphics requires access to the internal workings of the computer. Programs written in interpreted BASIC are usually too slow to create the graphics you've come to know and expect. Therefore, we use advanced programming languages like C, Pascal, and Modula-2 whenever possible.

Unfortunately, pushing the machine to its limits sometimes causes problems. There are many different operating systems currently in use for the IBM PC and compatibles, ranging from PC- and MS-DOS 2.0 to PC- and MS-DOS 4.0. Programs that operate correctly with one operating system sometimes fail under a different one.

Soon after releasing "Arcade Volleyball" (March 1988), we realized that the program wouldn't run under some implementations of DOS 2.1. Fortunately, we've solved the problem and have a new version that works correctly under every version of 2.1 we've seen. If you've had a problem with Arcade Volleyball, simply write to us at COMPUTE!'s PC Magazine, *P.O. Box 5406, Greensboro, North Carolina 27403. Include a note that mentions Arcade Volleyball and states the type of computer and graphics system you're using as well as your DOS version (type VER at the A> prompt to find out which version of DOS your computer is running). We'll see that you quickly receive the newest version of Arcade Volleyball. We apologize for any inconvenience this may have caused.*

Empty the Garbage

I'm writing a BASIC database program. I've noticed something strange—the program seems to pause from time to time. The pauses are never the same length, and the interval between pauses varies, too. I can't figure out what's causing it. The pauses don't really hurt the program—everything continues normally after the pause—but they're really annoying. Do you know why this is happening?

Alex Hohs
Santa Cruz, CA

We suspect that you're a victim of garbage collection. *Garbage collection has to do with string variables. Strings are tricky for a computer to handle. The computer must set aside enough room in memory for all the strings declared in a program. The length of a string can change as a program runs, causing memory allocation problems.*

When a string is created in BASIC, the actual string is stored at the top of BASIC memory. The string's name, length, and a pointer to the address of the string are stored after your program in memory. If you change the string, the new string is copied to the current top of memory (below the previous strings), and the pointer is changed to the address of the new string. If your program does a lot of work with strings, sooner or later the strings fill all memory from the top of BASIC until they collide with variables, arrays, or your program.

This is where garbage collection steps in. A garbage collection routine in BASIC looks at each string, finds the string data, and repacks each string back to the top of memory, discarding unused strings along the way. Obviously, this can take a while. It's difficult to predict just when the garbage collection will occur, and, when it does happen, the machine appears to lock up.

One solution to this problem is to use the FRE( ) function. The syntax of this function is as follows:

```
BytesFree = FRE(x)
```

or

```
BytesFree = FRE(x$)
```

The variables in these commands are dummies; they can be any string or integer variable and have no effect on the function. Both commands return the number of free bytes for strings, but the second form has a side benefit: It forces BASIC to perform garbage collection. Periodically calling this function with a string variable results in shorter garbage collection delays.

Ghost in the Machine

I have an AT compatible with a 32MB hard drive and two 5¼-inch floppy disk drives. When I run CHKDSK on the hard drive, the computer says it has two hidden files. When I run CHKDSK on the floppies, however, the computer finds no hidden files at all. What are these hidden files, and should they be on my floppies?

Dennis Heckman
Chicago, IL

Right after you turn on its power, a PC performs a complex series of housekeeping operations before it turns the system over to you. This process involves loading two hidden system files named IBMBIO.COM and IBMDOS.COM from disk. These are machine language programs that the computer needs in order to operate correctly.

IBMBIO.COM is an extension of BIOS, the PC's Basic Input/Output System. Most of the BIOS is stored in read only memory (ROM), but portions are stored in the file IBMBIO.COM. This file loads and executes when the system boots to initialize input/output devices and perform other system tasks.

The PC's DOS (Disk Operating System) is a separate program called IBMDOS .COM. Its purpose is to manipulate disk data. Since none of the DOS is stored in ROM, it's also necessary to load the

IBMDOS.COM program from disk and install it in memory when the system boots up. After initializing the system for BIOS, IBMBIO.COM moves IBMDOS.COM into the correct memory area and transfers control to DOS, which in turn does its own initialization before turning control over to you.

You may wonder why the BIOS and DOS aren't built into the PC's ROM. Actually, some compatibles do have the BIOS and DOS in ROM, but most don't. This keeps upgrading as simple as possible. Because the BIOS and DOS are stored in disk files, you can boot with a different version of DOS just by putting a new System Master disk in your drive and turning on the machine. Upgrading a machine with built-in BIOS and DOS involves replacing some of the ROM chips (a much more difficult task).

Since IBMBIO.COM and IBMDOS .COM are critical to normal operation, they're made invisible to user commands such as DIR. Both files are further protected by making them read-only: If you can't write to a file, you're less likely to corrupt it by accident.

Because you generally use only one boot disk, these files are not normally placed on a floppy disk when you use the FORMAT command. You can instruct DOS to format a disk with these files by using the FORMAT /S command. This creates a boot disk with both the hidden files IBMBIO.COM and IBMDOS.COM and with the file COMMAND.COM on it.

Welcome to Baudland

What's the difference between 1200 and 2400 baud?

Karl Stephens
Seattle, WA

Many people use the term baud *when referring to telecommunications transmission speed. In popular usage, the higher the baud rate, the faster the modem can transmit characters over the telephone lines. You'll hear people referring to 300-, 1200-, 2400-, even 9600-baud modems. However, this is technically incorrect. The more correct term is* bits per second, *abbreviated* bps. *A 2400-bps modem can transmit characters twice as fast as a 1200-bps modem.*

Baud refers to the division of each second into tiny, discrete pieces (a process known as signal modulation*) by the modem's electronic circuitry. A 300-bps modem's signal is indeed modulated at 300 baud. Since each tiny division holds one bit of data, the effective transmission rate is 300 baud per second times 1 bit per baud, or 300 bps.*

A 1200-bps modem is another story, however. Such a modem divides each second into 600 pieces. Using a technique called four-level phase shift keying, *each piece can represent two bits. Multiply 600 baud by 2 bits per baud and you end up with 1200 bits of information per second.*

High-speed 2400-bps modems also use a modulation rate of 600 baud. What's different is the method of the phase shift keying. They use 16-level phase shift keying, so each piece can represent four bits. Multiply 600 baud by 4 bits per baud and you have 2400 bits of information per second. Technically, both 1200-bps and 2400-bps modems are 600-baud devices.

Most transmission protocols use ten bits to send one character of data. Therefore, the approximate character-transmission speeds of 300-, 1200-, and 2400-bps modems are 30, 120, and 240 characters per second. If you want to calculate the approximate time it will take to send or receive a file, divide the length of the file by the transmission speed in characters per second. Thus, a 16K file will take about nine minutes to send at 300 bps, or a little over a minute at 2400 bps.

Tastes Great! Less Filling!

Could you please tell me which programming language is best? I've heard a lot about Pascal, C, Prolog, and others. Which should I buy?

Bryan Johnson
Ft. Worth, TX

There's no such thing as a "best" computer language. Each language has its own strengths and weaknesses. The language that's best for you depends mostly on what kind of programs you'd like to write and your own personal tastes.

Pascal is a computer language developed by Nicklaus Wirth in the 1970s as a teaching tool. Due to Pascal's strict rules, programs written in Pascal are generally clear and understandable, if sometimes a bit wordy. With the introduction of Borland's enormously successful Turbo Pascal, *Pascal almost became the* de facto *programming language for the PC. Because it was developed as a teaching tool, Pascal has no easy way of accessing the internals of a computer. Many people (notably C enthusiasts) feel this makes Pascal too restrictive.*

One of the most popular languages today is C. Developed in the early 1970s by Brian Kernighan and Dennis M. Ritchie at Bell Labs, it was originally designed for systems programming. C was soon ported to other computers and has become a popular language for home computer users as well.

C is sometimes called a midlevel language because it is easier to program in and understand than assembly language but lacks some of the convenience features found in higher-level languages like Pascal. One of the most striking things about C is its brevity: The language has fewer than 30 keywords in all. But don't let the simplicity fool you—C is an exceptionally powerful language. And because it was developed for systems programming, C readily allows you to perform the bit-twiddling needed to access the internals of your machine.

All this power comes at a price. C does very little error checking for you, so errors in C code can be hard to find. Because C allows access to the entire machine, it's easy to write to a memory location that you shouldn't write to. And because C is so terse, C programs can be difficult to read.

Prolog was developed by Alain Colmerauer at the University of Marseilles as a tool for programming in logic (hence, the name Prolog). In the years since, it has become one of the languages of choice for programmers interested in artificial intelligence.

Prolog is a declarative language. It is completely different from procedural languages like Pascal and C. In a procedural language, programmers provide step-by-step instructions that tell the computer how to solve a problem. This means that the programmer must know how to solve the problem before the computer can do it. With a declarative language, the programmer need only supply a description of the problem and the rules for solving it. The computer is left to determine how to go about finding a solution.

If program speed is important, assembly language is the language for you. A program that works well in assembly language may be unacceptably slow when written in a higher-level language. Every high-level language includes some inefficiency, or overhead, *as compared with assembly language. The amount of overhead depends on several factors (which language is used, the quality of the compiler, the cleverness of the programmer, and so on), but it's always present. As a general rule, the more speed-critical the task, the more you stand to gain by programming in assembly language.*

Assembly language also offers the ultimate in flexibility and control. High-level languages have certain constraints that may be inconvenient or impossible to circumvent in some cases. When you can control the microprocessor directly, the only limits are those imposed by the machine itself.

Programmed NumLock

I'm writing a BASIC game for my PC, and I want to be able to use both the cursor and number keys on the numeric keypad. Rather than displaying a message like *Please make sure that NumLock is off,* I'd like to have my program set NumLock on or off as needed. Can you show me how?

William Colgate
Cleveland, OH

Memory location 1047 is what you're interested in—bit 5 in particular. This bit

controls the state of the NumLock key: 1 means NumLock is on; 0 means it's off. To set NumLock, all you need to do is turn this bit on or off. The rest of the bits at this location control other important keys such as CapsLock and ScrollLock, so you'll want to leave them unchanged.

To turn on NumLock without changing the other keys, you must retrieve the contents of location 1047 with a PEEK, OR that value with 32, and then POKE the new value back into 1047. The following code segment performs this for you:

```
100 DEF SEG=0:POKE 1047,PEEK(1047)
    OR 32
```

The CAPSON program on the May 1988 disk does this but in machine language.

To turn off the NumLock key, use the following code:

```
200 DEF SEG=0:POKE 1047,PEEK(1047)
    AND 223
```

Tracking Files

In the November 1988 issue, you had a program called "MealMaster." You state that since MealMaster opens several files, the line FILES=20 must be added to CONFIG.SYS. What is the FILES parameter, and what does it do?

The FILES command is used to specify how many files DOS can have open at one time. The default number of files that can be open simultaneously is eight. DOS automatically opens five files (C programmers will recognize these as standard input, standard output, standard error, standard printer, and standard auxiliary), which means that other programs can open up to three more. For most programs this is sufficient, but MealMaster is special—it opens several files at one time. That's why the maximum number of open files must be increased.

If you run another program and get an error message indicating an insufficient number of files, try increasing the maximum open-file limit in CONFIG.SYS (you'll have to reboot before the change takes place). You can allow up to 255 open files, but there's a tradeoff: DOS allocates a small amount of memory for each file. The more files you allow, the less free memory you'll have for programs.

Compatibility Problems

I recently purchased a PC compatible. According to the manufacturer, it is supposed to be 95-percent compatible with the PC. I was also informed that programs that bypass the BIOS won't run on my machine. Can you explain what the BIOS is?

Jerry Watkins
Denver, CO

BIOS stands for Basic Input/Output System. It's a collection of important machine language routines that the computer uses to communicate with other devices such as the keyboard, screen, disk drive, and printer.

Generally, you don't have to worry about the BIOS when programming in a higher-level language like Pascal, C, or BASIC, because these languages handle calls to the BIOS for you. The BIOS is most useful when writing assembly language programs. Each of the routines in the BIOS performs a specific function, such as printing a character on the screen, reading the keyboard, or accessing the disk drive.

The actual code for these routines is slightly different for each type of compatible (for copyright reasons). In order to ensure maximum compatibility, the BIOS routines are not accessed directly, but through interrupts. Each routine has its own interrupt that stays the same within each model. This consistent numbering scheme enables PC-compatible computers to run most programs written for the IBM PC, even though the actual BIOS routines may be very different.

Problems arise when a program bypasses these interrupts. Although this results in a faster program, it also limits its compatibility. For maximum speed, some programs bypass the BIOS altogether (for example, a program may have its own customized routine for printing to the screen). Such a program will probably work only on the machine for which it was designed.

Early Exit

How do you get out of a FOR-NEXT loop?

The FOR-NEXT loop is probably the most heavily used looping construct, and nearly every computer language has it in some form or another. Its purpose is to execute a group of statements a known number of times, but there may be times you want to exit the loop early. From BASIC, the simplest way to exit the loop is to use a GOTO statement, as in the example below:

```
10 DIM A$(50):FOR A = 1 TO 50
20 INPUT "ENTER A STRING (Q TO
   QUIT)";A$(A)
30 IF A$(A) = "Q" THEN GOTO 50
40 NEXT
50 END
```

This program lets the user enter up to 50 strings, but the user can stop entering at any time by entering the letter Q. Without the GOTO statement, all 50 strings would have to be entered. This is useful for languages that have a GOTO command, but what about languages that don't (like Pascal)?

Another way to exit the loop is to set the loop variable equal to the terminating condition. The above example can be rewritten like this:

```
10 DIM A$(50):FOR A = 1 TO 50
20 INPUT "ENTER A STRING (Q TO
   QUIT)";A$(A)
30 IF A$(A) = "Q" THEN A = 50
40 NEXT
50 END
```

Now, when the user enters a Q, the variable a is set to 50. Because this is the end condition of the loop, the loop ends. This method works for Turbo Pascal *4.0 as well:*

```
PROGRAM Test(INPUT,OUTPUT);
CONST MaxStrings = 50;
VAR Counter : INTEGER;
    Strings  : ARRAY[1..MaxStrings]
      OF String;

BEGIN
  FOR Counter := 1 TO MaxStrings DO
  BEGIN
    WRITE('Enter a string (Q to Quit)');
    READLN(Strings[Counter]);
    IF Strings[Counter] = 'Q' THEN
    Counter := MaxStrings;
  END; { FOR }
END. { Program Test }
```

But there are even stricter languages (including some versions of Pascal) that don't allow assignment to a FOR-NEXT loop variable. Why? The reason is based on the purpose of the FOR-NEXT loop: It's supposed to execute a group of statements a given number of times. There are other looping constructs to handle loops that execute an unknown number of times.

In this situation, you want the loop to execute at least once. This is the perfect place for Pascal's REPEAT–UNTIL loop. Pascal has another loop (the WHILE-DO) that is useful for executing loops zero or more times. The equivalent C loops are the DO-WHILE and WHILE loops. Even Microsoft BASIC has the WHILE-WEND looping construct that executes zero or more times. If you're a serious programmer, get to know these other loops. The time spent learning them will pay for itself many times over in the long run. **PC**

Compilation and responses by Jim Fuchs.

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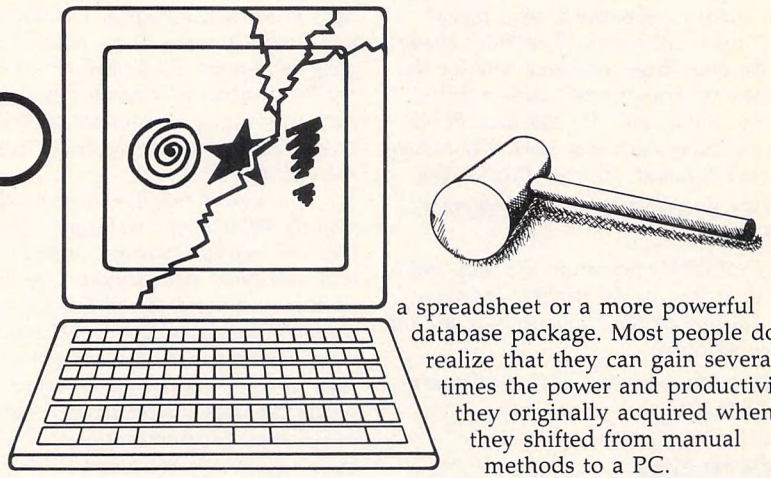

Have It Your Way

Robert A. Moskowitz

This column's message is simple: Take charge of your computer system. Don't endure its eccentricities or shortcomings. Keep trying to make your system work for you exactly the way you want it to.

Consider this: Of some 8 million PC users, at least 6 million are dissatisfied with how their system operates, and at least 2 million are regularly frustrated by some Catch-22 in their computer's capabilities. I'm constantly surprised by the number of otherwise intelligent, assertive, successful, and competent people who regularly let their computing machines dictate the work rules and set the limits on what can be done.

Stories of Neglect

For example, a sales executive with a new PC actually used it for three months without an AUTOEXEC.BAT file to set things up for him. Every day, he typed in the date and time manually, as well as the names of the memory-resident programs he used. He also entered the name of each application as he wanted it. A tolerant person by nature, he willingly deleted unwanted files one by one, and he waited—generally doing nothing—until the computer finished printing one form before he started work on another.

A college professor was even more tolerant of his computer's limitations. For more than two years, this academic whiz-kid kept working on a computer with a faulty disk drive. He kept insisting that it was some unlikely combination of random events that locked up the keyboard and scrambled his data files. He suffered at least 100 database crashes—each one costing him hours of repeated typing—before he had the computer repaired. It took a technician only four hours to eliminate two conflicting memory-resident programs and replace the disk controller card. The computer crashed no more, and within a week the professor had regained all the repair time and more.

A hardboiled real estate developer was just as bad. She wasted hundreds of hours on her computer because her software was barely adequate for the tasks she was attempting. She set out gamely to calculate the costs of buying, financing, and rehabilitating a commercial property on her computer. But she tried it with software she already knew: a simple, even primitive, database package that was too slow, used excessive memory, and offered only a few financial functions. She would have been better off doing it by hand.

Sometimes we're too smart for our own good. In the human/machine relationship, we are far more adaptive, self-programming, and flexible than computers. Thus, when an irresistible force (like a bulky desktop computer) meets a highly movable object (like a friendly, agreeable, willing computer user), too often the person gives way and the computer prevails.

It doesn't sound like a good result, does it? But it happens most of the time.

For an analogy, consider learning to drive a car. Once you get the car moving, you're driving, and it's exhilarating. But you'll get even more value, pleasure, and practical use from the car when you learn to shift it out of first gear and go a little faster.

It's the same with a computer. Too many people learn to turn it on and use a simple program or two. They love it, but they resist shifting into second gear—the equivalent of changing to a better word processor or learning to use a spreadsheet or a more powerful database package. Most people don't realize that they can gain several times the power and productivity they originally acquired when they shifted from manual methods to a PC.

If you're like most people, you're probably far too willing to put up with the limitations and problems of your PC. You may work in unnecessarily complicated ways simply to compensate for failings in your computer's hardware and software. As a result, you're probably not getting anything near your system's full value and performance. But you should be, and you *can*.

Changed Lives

Here's an example. A woman running a business at home buys a desktop computer to help her do a better job of correspondence, proposal writing, and billing. She learns to turn on the computer, boot it from a floppy disk, and run a fairly powerful word processing program. She uses the system for all her business writing and for billing. She's satisfied.

Within a year, though, her business has grown enough that she begins to outstrip her knowledge of the computer capabilities. But she continues to struggle along with the system she's already using, even though her billings now take too many hours each week. She puts up with complications and limitations that no longer make sense.

She patiently types all the itemized amounts into a word processor to create an invoice, then punches the same numbers again into her hand-held calculator to get a total. Then she copies the total from the calculator into the computer. This back-and-forth procedure might be acceptable for a few items on a few invoices, but it can be ruinously expensive and error-prone when it's used for 20–50 invoices a week.

Eventually, the businesswoman brings in a consultant who shows her how to do billings much more quickly and accurately with a simple accounting program. He demonstrates how she

can use a spreadsheet program to prepare more detailed proposals for her clients and how to develop and print a portfolio of variations on her proposals in just minutes. He also starts building a simple database to contain and instantly retrieve information on her clients and the projects she has in the hopper. Although she's reluctant to start learning anything new on the computer, after a week of using the new software she's much more satisfied than before.

If she had stayed in first gear, this businesswoman would still be wasting her time with the old setup. But once she incorporated simple improvements into her existing computer system, she realized the benefits. Now she would never go back to her old ways of using a PC.

Almost everyone who tries it can do it; shifting to second or third gear almost always gives you a better, faster ride.

The sales executive mentioned earlier was also reluctant to shift to a higher gear. But once he agreed to try, he found his computer a lot easier to use and much more efficient. Adding an AUTOEXEC.BAT file to the boot sequence has made his computer automatically load the programs he likes. The system also changes subdirectories automatically and offers him a menu of his favorite applications. He can check all the files on his disks and copy, move, or delete them in groups by using file-management utilities he read about in a magazine. A simple and inexpensive software print spooler gives him an extra 30 minutes to an hour of work time every day; it lets him use his computer while forms are still printing.

Although you may not believe it, you can almost certainly improve your own computer system, making it operate more the way you want it to. The main thing is to demand a little more from your system. You can also spend a little money to save a lot of time. There are four keys to making your computer system do things your way.

Keys to Success

The first key is to keep finishing the sentence *Wouldn't it be great if this computer could. . . .* And don't be satisfied with anything less than full implementation of your ideas. Most people acquire a computer system to handle a specific task. But it's a mistake to be satisfied too easily. Instead, keep looking for the next thing your computer can do.

For example, an insurance broker bought a PC to run various rating programs from insurance companies. It did the job very well, and he was satisfied. But when pressed to find more uses for the same computer, he discovered the PC could run other software with very little effort. Now when it's not rating risks, his PC is pumping out direct mailings to thousands of clients and bringing in more business. While looking for other functions, he found that spreadsheet software would allow his computer to help with his taxes. A forms program he found made it easier to store and complete the applications and other paperwork required by the insurance companies.

The real estate developer fought like the dickens against changing to new software. But after repeated demonstrations and a promise to put everything back the way it was after a week (if she still wanted it that way), her computer guru got her to try some new software.

With his help, she began using a powerful spreadsheet package to create a detailed economic model of a rehabilitation project she was starting. The model helped her identify and control her main materials and labor costs, which she then monitored so carefully that she shaved $10,000 off the lowest of her own estimates for rehabilitating the building.

At the same time, she converted her existing database files to a format that could be used by a more powerful database program. Almost instantly, she found she could search for data and generate comprehensive reports much faster and better than before.

Today, she has invested in a powerful portable computer system that she takes with her to every job. With the help of project-management software and frequent printouts of instructions for each of her subcontractors, she is now able to manage several real estate projects at once. And she handles them with greater control and efficiency than when she tried to manage one at a time with the old, more familiar software. She has learned her lesson, and today she's always on the lookout for better, more powerful ways to use her trusty PC.

Although nearly two-thirds of today's installed PCs use outdated chip and data-storage technologies, most of these systems can still be augmented with the right software and hardware.

The second key is to understand that your computer system, much like your car, is always getting closer to being replaced with a newer model. Within a few years, your computer will be hopelessly outclassed by newer systems, and within a few more years it will be more a collector's item than a practical business tool—like a phonograph that plays only 78-rpm records, or a Model-T Ford.

If you're not comfortable with the keyboard, for example, consider adding a mouse or trackball cursor control. If you want more screen detail, upgrade your display to color, perhaps even to the new VGA standard.

In view of its short life span, you shouldn't let a computer system dictate operational procedures to you, either. If your current system won't do what you want, don't be afraid to try the new software that your colleagues or friends recommend. If you preserve your existing data, you're taking no risk except for the time you spend experimenting. Most times, of course, you won't change to the new software. But if you find something more powerful and faster only once a year, you'll recapture all the time spent experimenting and more.

The third key is to realize that learning to operate a computer is like learning to drive—it's only a means to further your accomplishments and enjoyment. Many people feel that when they've learned their word processor, database, and spreadsheet programs, they've completed their computer education. But this is like believing that driving around the neighborhood in first gear is all you'll ever need from your car.

In reality, learning to drive your car or operate your computer and its software is a continuing process. Over the years, you learn to drive farther and faster with greater confidence and skill. Eventually, your car can take you thousands of miles to many different destinations. In the same way, your simple desktop computer can take you far and wide into many new and interesting application areas. For business people, that little PC can easily help with decision making, critical path and project management, number crunching and data analysis, communications with far-flung locations, client contact, and much more.

The fourth key is to be a little more rigid when it comes to using your computer. This is the most important point. You're innately more flexible than your computer. But if you bend too easily, the computer will remain rigid. You'll tolerate entering data again and again rather than forcing the computer to communicate. You'll spend hours coaxing the last bit of performance out of your computer when a more advanced approach could accomplish the work in minutes. You'll keep switching floppy disks and working with tiny files when the computer could just as easily support megabytes of information.

In general, you'll find it's far better to use your natural human flexibility to experiment with different configurations for your system. That way you won't find yourself stuck in a rut. And isn't that why you bought your computer in the first place? **PC**

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PC NEWS & NOTES

Arlan R. Levitan & the Editors

Lowe Hits the Road

As predicted months ago in this column, the IBM executive responsible for the introduction of the PS/2 line of computers is no longer wearing a Blue suit. William Lowe resigned from his post as president of IBM's microcomputer division in early December 1988 to take a senior-level position at Xerox. IBM spokespersons have repeatedly stated that Lowe resigned for "personal reasons," but many believe he left because IBM has lost much of its PC market share.

Lowe led off in January 1986 with the much ballyhooed PC RT, a high-end product based on reduced instruction set chip (RISC) technology. The RT never caught on with the engineering-workstation crowd it was intended for and was left in the lurch by faster and cheaper 80386 systems and competing products based on Motorola's 68000-series microprocessors.

Everyone expected great things from IBM in the way of a laptop computer. Lowe and company rolled out the PC Convertible in April 1986. IBM's laptop looked pretty enough, but it was marred by several fatal flaws. The Convertible was slow and heavy, and required expensive and ungainly add-ons to use "exotic" devices like a printer or external monitor. Ironically, the Convertible also suffered from compatibility problems. Several popular software packages wouldn't run on it. Those that did were less than pleasant to use on the LCD display, which went through several upgrades to improve its legibility. By the time the dust had cleared, Toshiba, Zenith, and NEC had all but locked up the laptop market, leaving the Convertible gathering dust on dealers' shelves.

By September 1986, everyone was selling clones that were 50-percent faster and significantly less expensive than the IBM PC AT. Even former true-Blue corporate customers were beginning to jump ship. After hinting for a number of months about an upcoming clone killer, IBM announced the PC XT 286, a befuddling hybrid machine that melded the AT's 80286 processor with the bus architecture of the PC XT. Even more confusing was the price, considering the performance of the XT 286; it yielded about half the power of similarly priced AT compatibles.

In all fairness, the PC RT, Convertible, and XT 286 will likely be considered brief footnotes in the final assessment of IBM-compatible computing in the eighties. The true measure of William Lowe's vision will be the eventual success or failure of the spring 1987 decision to dump the successful AT bus for the PS/2 Micro Channel Architecture.

Some analysts argue that IBM has all but conceded the consumer market to compatibles manufacturers. The appointment of James Cannavino, former head of IBM's highly lucrative mainframe manufacturing arm, tends to lend credence to that argument and hints at IBM's real PS/2 strategy. If the promised links between IBM mainframes and Micro Channel–capable systems come to fruition, corporate America may be persuaded to replace millions of $1,000 terminals with $5,000 PS/2s.

In one of his last public appearances before the announcement of his departure, Lowe indicated that IBM is trying to soft-pedal its former demand for 5-percent royalties on compatibles using licensed PS/2 technology. It may be as long as four years before the Micro Channel patents are issued. According to Lowe, "Until patents are issued, no patent royalties will be collected."

IBM's change in attitude was apparently enough to tempt Advanced Logic Research (ALR) and Wyse Technology to join Tandy in offering PS/2 compatibles of their own.

In the same breath, however, Lowe made it clear that IBM intends to play hardball with the coalition of PC manufacturers who are promoting the AT-compatible Extended Industry Standard Architecture (EISA): "We do not consider the EISA coalition a legal entity. . . . We have some very basic patents associated with computing, so that almost everyone who builds a PC needs to deal with us." Many speculate that by refusing to deal with the coalition as a whole, IBM can use its existing patents as a wedge to keep the coalition members on unequal terms.

In a Flash!

There's a new type of nonvolatile memory chip coming to market that may radically alter microcomputer mass storage. What's so special about Intel's *flash chip?* Unlike regular memory, flash chips can retain their contents for a hundred years or more without power. In use, the chips are electrically erased and totally rewritten anytime a change in their contents is required. This makes them unsuitable for use as main memory, but dandy as hard drive substitutes. One-megabit versions of the chips are due late in 1989. The first high-capacity storage devices (100 megabytes or more) using the new technology will likely appear in early 1990.

Debased in Court

You're nobody in the microcomputer business these days unless you're suing somebody or you're the target of a lawsuit. Ashton-Tate lowered the legal boom on Fox Software in late November, charging that Fox's database products infringe upon the look and feel of *dBase III Plus*. In its brief, Ashton-Tate submitted a number of screen shots that show almost identical menu structures and screen formats for various functions of *dBase III* and Fox's *Foxbase Plus*.

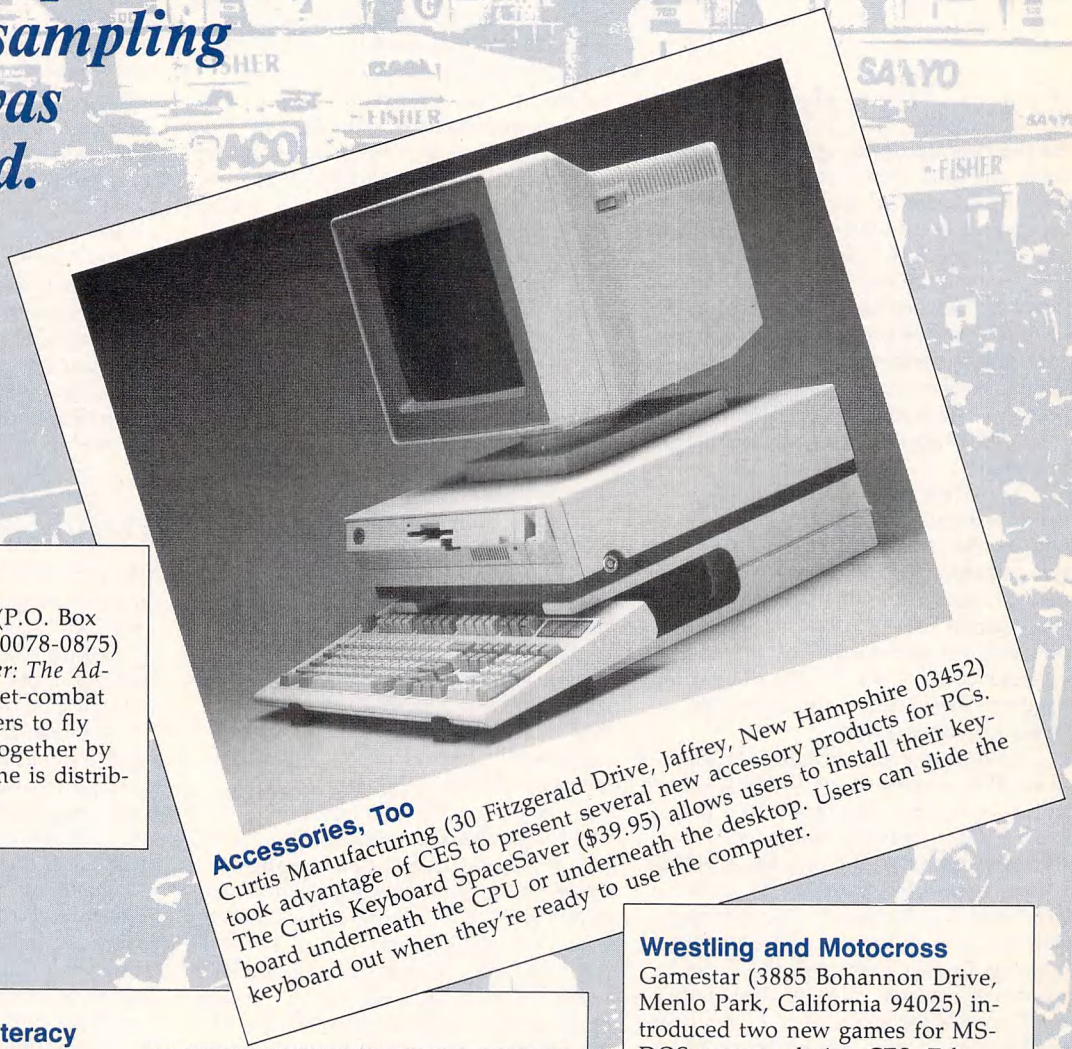
Far more onerous than the look-and-feel issue to manufacturers of competing products that use the *dBase* language and file formats is Ashton-Tate president Ed Esber's assertion that "products that use our file structure as their native file structure infringe on our technology." Esber has also stated in the past that Ashton-Tate considers the *dBase* language itself to be his firm's intellectual property. If Ashton-Tate acts upon those premises, subsequent legal proceedings may need to be held in Yankee Stadium.

Although Esber has been hinting about the possibility of impending legal action since early in 1988, many see the move as a last-ditch attempt to hold on to market share. Ashton-Tate needs to buy some time while it tries to

CES Special Report

The 1989 Winter Consumer Electronics Show, held this past January in Las Vegas, was the site for an explosion of new PC products. Here's a sampling of what was introduced.

Mickey McLean



Taking to the Skies

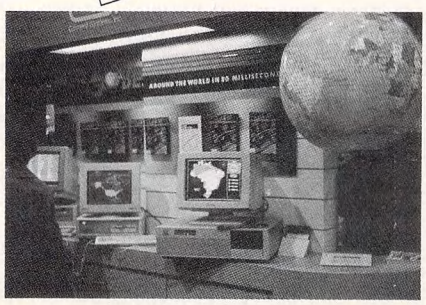
Velocity Development (P.O. Box 875, Palatine, Illinois 60078-0875) demonstrated *Jet Fighter: The Adventure* ($49.95). This jet-combat simulation allows players to fly over 30 missions tied together by one story line. The game is distributed by Brøderbund.

Accessories, Too

Curtis Manufacturing (30 Fitzgerald Drive, Jaffrey, New Hampshire 03452) took advantage of CES to present several new accessory products for PCs. The Curtis Keyboard SpaceSaver ($39.95) allows users to install their keyboard underneath the CPU or underneath the desktop. Users can slide the keyboard out when they're ready to use the computer.

Fight Geographic Illiteracy

PC-Globe+ (Comwell Systems, 2100 South Rural Road, Suite 2, Tempe, Arizona 85282; $69.95) is an updated version of *PC-Globe*. The program provides maps, a comprehensive database for 177 countries, and the ability to generate geographical graphics for slide presentations or desktop publishing. *PC-Globe+* can be used in education, international marketing, and the travel industry.



Wrestling and Motocross

Gamestar (3885 Bohannon Drive, Menlo Park, California 94025) introduced two new games for MS-DOS systems during CES. *Take Down* ($34.95) is a wrestling game that features outrageous characters and actions in the ring. *Suzuki RM 250 Motocross* ($39.95) simulates world-class 250cc motocross racing where players vie for the U.S. Motocross Circuit Championship.

What a Knockout

The IBM PC version of *TKO* ($39.95) was introduced by Accolade (550 South Winchester Boulevard, Suite 200, San Jose, California 95128). This first-person perspective simulation of boxing lets players step into the ring to fight five different challengers for the title of Accolade Heavyweight Champion. Players can choose from a variety of punches, target areas, guard positions, and player attributes.

A Plus for Novice Users

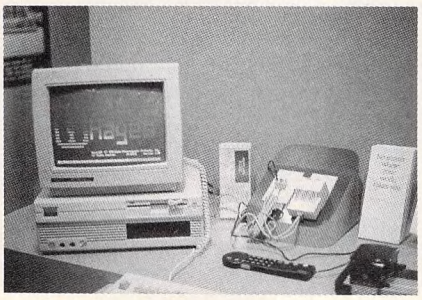
Vendex (40 Cutter Mill Road, Suite 438, Great Neck, New York 11021) introduced the Headstart Plus ($995.00) 9.54-MHz IBM XT–compatible computer system for the inexperienced user. The hardware comes bundled with free software designed to meet the end user's immediate and future computing needs. The Plus features two 360K 5¼-inch floppy disk drives, MS-DOS 3.3, and GW-BASIC.

Look No Wires!

Camerica (230 Fifth Avenue, New York, New York 10001)—makers of joysticks for Nintendo, Commodore, and Atari—has introduced the Freedom PC, the first wireless remote-control joystick compatible for the IBM PC. Its features include arcade-style action and switches for automatic rapid-fire or manual play. One- or two-player and simultaneous two-player action is available. A suggested retail price was not available at press time.

Home Computer Communication

The Hayes Personal Modem 1200 and *Smartcom EZ* ($179.00) communications software from Hayes Microcomputer Products (P.O. Box 105203, Atlanta, Georgia 30348) provides a complete data communications solution for home personal computer users. Users can receive quick access to online services, transfer files over phone lines, and use their PC as a terminal for remote computer systems.



New Game Sounds Good

Origin Systems (136 Harvey Road, Building B, Londonderry, New Hampshire 03053) announced the release of the IBM PC version of the fantasy role-playing arcade game *Times of Lore* ($39.95). The game features a musical soundtrack that can be played through the Ad-Lib Music Synthesizer Card and *Creative Music System.*

resolve performance problems and several serious bugs in *dBase IV,* which was recently released to a flurry of less-than-rave reviews.

Within a month of the suit, Fox Software formally responded. Fox asserted that George Tate, one of A-T's founders, had the opportunity to examine *Foxbase* when it was first released and should have raised any objections to the product's look and feel at that time. Fox also countersued, charging that Ashton-Tate misappropriated Fox trade secrets during merger negotiations held between the two companies in 1986.

VGA Powwow

The industry's leading display-card manufacturers have formed a consortium to back Super VGA, an extended version of the IBM VGA display standard. Video Seven, Paradise Systems, Orchid Technology, STB Systems, Genoa Systems, and Renaissance GRX are the charter members of the Video Electronic Standards Association (VESA). The Association proposes that the U.S. market adopt the 800 × 600 pixel display standard that is currently in widespread use in Japan. IBM's VGA standard is currently limited to a maximum resolution of 640 × 480 pixels. According to the consortium members, many of today's VGA display cards are already capable of the higher resolution when used with multiscanning color monitors. They also claim that the adoption of the proposed standard will bring about widespread software support for the enhanced display mode.

Comeback Times Two

Leading Edge may be basking in the PC spotlight again, on the heels of several years spent lurking in the shadows of the low-priced-compatible market. LE, generally acknowledged as the first clone manufacturer to break the $1,000-price barrier, has lately been nudged aside by the likes of Amstrad, Vendex, and Packard-Bell. The Leading Edge Model D3 breaks new ground in the 80386 arena by offering a complete system for less than $3,000. The system's dual-speed processor runs at 8 or 16 MHz and comes equipped with a full megabyte of memory, a 1.2MB floppy disk drive, and a VGA display card with monochrome monitor. As an introductory offer, Leading Edge is also sweetening the D3 package, tossing in a fast 65MB hard disk drive.

Three series of computers with the familiar Panasonic label will surface early this year. The FX-1650 line will be based on the 8086 microprocessor with operating speeds of 4 and 8 MHz and with 640K of RAM. Single-floppy, dual-floppy, and 20MB hard disk configurations are priced at $999, $1,149, and $1,499, respectively. The FX-1750–series models substitute an 80286 processor for the 8086 and are pegged at $1,299, $1,449, and $1,799 for like configurations. Those with $4,000–$5,000 of loose change to drop may opt for an 80386-based FX-1950–series machine instead. A six-pound laptop is also rumored to be in the offing.

Panasonic owners who pop the hood on their new machines may be in for a bit of a surprise: All three lines will be manufactured for Panasonic by Tandy. Rumor has it that Panasonic opted for the Tandy connection to avoid a repeat of its last venture in microcomputing. In 1986, Panasonic quietly discontinued its popular line of Business Partner PC compatibles after it was discovered that much of the system code used in its micros had been blatantly copied from IBM.

Game Suit

Nintendo isn't winning any popularity contests—at least not with the Software Publishers Association. According to SPA Director Ken Wasch, "Nintendo has, through its complete control and single sourcing of cartridge manufacturing, engineered a shortage of Nintendo-compatible cartridges. . . . These shortages could be prevented by permitting software vendors to produce their own cartridges. . . . Hardware company control over the production and distribution of software, whether in cartridge or floppy disk format, dampens the competitive spirit in the industry."

Nintendo was recently on the receiving end of a $100-million lawsuit filed by Atari Games (no relation to Jack Tramiel's operation). Tengen, a division of Atari Games, is terminating its agreement with Nintendo. Nintendo is countersuing Atari Games for "conspiring with Tengen in activities that violate the Racketeer Influence and Corrupt Organization Act." Tengen developed and marketed several Nintendo titles.

Nintendo is able to control third-party licensing of games designed for its home videogame machine because it has exclusive control of a proprietary chip that must be in each game cartridge. Atari has reportedly developed a chip that duplicates the key function of the Nintendo chip without infringing upon Nintendo chip patents. The suit is viewed as a preemptive strike intended to establish damages that will result if Nintendo attempts to block Atari from selling the chip to software manufacturers. **PC**

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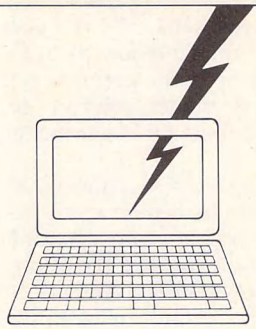

Thinking in C

Tom Campbell

One of the hazards of programming is thinking in the language to which one is most accustomed. Glance through a text on compiler theory written in the sixties and you'll see that its examples, while professing to be in a language-independent pseudocode, are a hair's breadth away from FORTRAN. A similar text written in the seventies shows pseudocode that bears a suspicious resemblance to Pascal. Contemporary books use C, or something very like it. This evolution is no accident. Like you and me, the authors think in the languages they know best, and they tend to express ideas that way.

When in Rome

Thinking in a language can be a blessing. Pascal was designed as a teaching language. Its code is exceptionally readable, and it's the only language in my experience that consistently looks like the algorithms I write.

Thinking in a language can be a curse. Borland's Phillippe Kahn, who is fluent in both Pascal and assembly language, and glib in both English and French, is still trying to live down his classic remark that C is a "write-only" language. (He said this *before* his company made a killing with *Turbo C*.) I've seen some exceptionally clear C, but it looked like Pascal. That's not necessarily a compliment. When in Rome, there are some very good reasons to do as the Romans do.

How to Think in C

C was designed with efficiency in mind. For example, many programs scan a file character by character. Common examples include word-count programs, compilers, and text formatters.

In the old days, we automatically assigned this to a procedure (subroutine, function—whatever) called GetChar, which retrieves the next character from the file. That seems prudent enough until you realize that each time you use GetChar you're making a call to the operating system. In machine terms, the overhead is enormous: Push the current address of the instruction counter, call GetChar, push its address, and call the retrieve-a-character-from-the-file routine from the operating system. This doubtless requires thousands of instructions. After the call, the return addresses are popped and control finally drops to the statement after GetChar.

As a C programmer, you shouldn't think in those terms. Instead, you should do it the C way: Read a chunk of the file into a buffer and simply point to the next character. A pointer increment typically requires a single machine instruction. With a little extra programming, you've increased GetChar's performance by a factor of several thousand.

Even the aforementioned buffer is fair game. You could take the easy way out and use an array of, say, 512 or 8192 characters. That's completely honorable for a use-it-once utility. But it isn't an ideal solution. It's a waste of disk space and a poor use of the heap (available system memory).

Instead, why not create a buffer as large as you can allocate? "Snooper" does just that. Snooper blasts through any binary (or text) file, detecting all strings that end in a 0 (the C convention), $ (used often in assembly language routines), or newline character.

Snooper checks the file's size and tries to allocate a buffer, *Buf*, the size of

```
/*
Snooper.c for COMPUTE!'s PC
By Tom Campbell
Tested using Quick C 1.1 and Turbo C 1.5.
*/

#include <stdio.h>
#include <ctype.h>
#include <io.h>

#define BufMax 50000        /* Default size of dynamically allocated buffer. */
#define MaxLen 81           /* Strings displayed are this length - 1. */
#define MinStr 6            /* Strings shorter than this are probably junk. */

FILE *InputFile;
char offsets;

void main(int argc, char *argv[ ])
{
    void Quit(char *msg, int errorlevel);
    void Snoop(FILE *InputFile);
    int strcmp(char *string1, char *string2);

    /* Check for correct number of arguments */
    if (argc < 2)
       Quit("Missing a filename. For example: \n \n \tSNOOPER BUDGET2.WKS", 1);

    if (argc < 3)
       offsets = 0;
    else
       offsets = (strcmp(argv[2],"/o")==0) | (strcmp(argv[2],"/O")==0);
```

the file. If the file is larger than *Buf*, it's handled in chunks the size of *Buf*. Using the small-memory model, 50K is a good maximum value for the buffer; if you compile the program using the large model, you can use a correspondingly larger maximum buffer.

This efficiency makes Snooper nearly as fast on a floppy-based system as on a hard disk because it requires the minimum disk reads for any file.

Snooper also releases the file's resources before terminating, even though DOS would do it for us. A C programmer should keep portability in mind. Managing resources like this eliminates a possible source of bugs when you're moving Snooper to another environment, where the operating system may not be so obliging.

Outthinking the Compiler

If you want to squeeze even more performance out of your code, visualize the compiler's code generation, or look at its assembly output. Take this common construction:

```
while (flag != 0)
{
.
.
.
}
```

This innocent-looking example sacrifices performance on the altar of convention. Think of how a *while* loop works. On all processors, a *while* loop generates assembly output whose pseudocode looks like this:

```
Top:
Test condition.
If result <> 0, GOTO Bottom
  .
  .
  (Body of loop)
  .
GOTO Top
Bottom:
```

In the *while (flag != 0)* loop above, two such tests are actually performed. First, *flag* is evaluated; then it's compared to 0. If the result is 0, the loop terminates.

But what's the test part of a *while* loop in C? It's an expression, and any expression is considered false if 0 and true otherwise. Since *flag* must be evaluated each time, the explicit comparison to 0 is superfluous. That means a simple *while (flag)* results in tremendous savings for frequently used loops. Some say it's less readable, but only if you

```
    if ((InputFile = fopen (argv[1],"r+b")) != NULL)
    { /* If filename is on */
        Snoop(InputFile);                       /* the command line, */
        Quit("Finished snooping.", 0);          /* open it and snoop. */
    }
    else Quit("Unable to open file.", 1);
}

void Snoop(FILE *InputFile)
{
    long AmountRead = 0;                        /* No. of bytes read into RAM buffer. */
    char *Buf;                                  /* Pointer to dynamically allocated buffer. */
    long BufPtr;                                /* Points to next char RAM buffer. */
    unsigned BufSize = BufMax;                  /* Size of dynamically allocated buffer.*/
    char c;                                     /* Next input char. */
    long FSize;                                 /* Length of input file. */
    long Position = 0;                          /* Current character's position in the file. */
    int StrSize = 0;                            /* Length of (legal) string being built. */
    char String[MaxLen];                        /* Buffer for string. */
    void Quit(char *msg, int errorlevel);
    void *malloc(size_t size);
    void free(void *block);
    void exit(int status);

    if ((FSize = filelength(fileno(InputFile)))==-1)  /* Determine the size of */
        Quit("Error getting length of file", 1);      /* the read buffer. If */
    else                                              /* the file is small enough, */
        if (FSize <= BufMax) BufSize = FSize;         /* it can fit in the buffer. */
    /* Allocate a buffer; if file is larger than BufMax, it's BufMax bytes. */
    if ((Buf=(char *)malloc(BufSize))==NULL)
    Quit("Not enough memory to continue.", 1);
    do
    { /* Read in the next bufferful of bytes. Quit if 0 chars are read. */
        AmountRead = fread(Buf, sizeof(char),BufSize,InputFile);
        if (AmountRead)
        { /* Terminating condition: 0 bytes read. */
            /* Loop through all the bytes in Buf. */
            for(BufPtr = 0; BufPtr < AmountRead; BufPtr++, Position++)
            {
                c = Buf[BufPtr];                      /* Point to the next character (byte). */
                if (c & 0x80)
                {                                     /* If it's extended ASCII, throw it out, */
                    StrSize = 0;                      /* reset the string, and fetch another char. */
                    continue;
                }
                /* These are the end-of-string markers.  */
                if (c == '\n' || c == '\0' || c == '$')/* If EOS marker has been found, */
                    if (StrSize >= MinStr)
                    {                                 /* and if String is long enough, */
                        String[StrSize] = '\0';       /* add the terminating */
                        if (offsets)
                            printf("%lX: ", Position);/* null byte, */
                        puts(String);                 /* print it, and */
                        StrSize = 0;                  /* reinitialize. */
                    }
                    else StrSize = 0;                 /* EOS found, but not long enough. */
                else
                {                                     /* Not an EOS char. */
                    if (StrSize==0)
                    {                                 /* If it's the first char and it's */
                        if (isalpha(c))               /* a letter, then add it */
                            String[StrSize++] = c;    /* to the string. */
                    }                                 /* If it's not the first, but it is */
                        else if (isprint(c))          /* printable, add it to the string. */
                            if (StrSize < MaxLen ) String[StrSize++] = c;
                } /* end if */
            } /* end for */
        } /* end if */
    } while (AmountRead);                             /* Stop when 0 bytes are read in. */
    free(Buf);                                        /* Deallocate dynamic buffer. */
}

void Quit(char *msg, int errorlevel)                  /* Prints message and sets DOS ERRORLEVEL. */
{                                                     /* By tradition, 0 means no error. */
    void exit(int status);

    printf("\n\n%s", msg);                            /* Display message, then */
    if (InputFile)
        fclose(InputFile);                            /* close file only if opened. */
    exit(errorlevel);                                 /* Return to DOS. */
}
```

speak C as a second language. In Snooper, there are several such tests. One of them is the bottom of the read-a-record loop, which ends with the test *while (AmountRead);* instead of the more obvious *while (AmountRead != 0);*.

About Snooper

To use Snooper, enter SNOOPER FILENAME.EXT [/O] at the DOS prompt. (If you specify the /O switch, Snooper prefixes each string with its offset address in hexadecimal.)

Like a simplified version of Peter Norton's TextSearch program, Snooper races through any binary (or text) file, snooping out strings that end in the line terminators mentioned above.

If you try Snooper on QC.EXE (the *QuickC* compiler), for example, you'll find intriguing identifiers like *Munge_ Buffer* and *ShellGet-Emulator*. Use it on the *Turbo Pascal* version 4 executable file, TURBO.EXE, and you'll see such reassuring text as *Mermaid Beta-test version—Not for sale!*.

Because Snooper's output is redirectable, you can use it to find a word in a binary file, like this:

```
SNOOPER \TP\TURBO.EXE | FIND "Mermaid"
```

One practical use of Snooper is to extract the online help from an executable file so you can study it while you're away from the computer. Simply run Snooper on your .EXE file and redirect the output to a disk file or your printer, and you'll have your program's online help offline.

For example, to print the online help in RUNNER.EXE, you'd use this command:

```
SNOOPER RUNNER.EXE >PRN
```

Snooper is also interesting because you can hollow it out and use it as a shell for any program that needs to hunt through every byte of a file, and needs to do so fast. You can make it a search program in only a dozen or so lines. Or you can improve on what Snooper already does best by trying to improve its search algorithm.

Although I left them out for brevity's sake, I discovered that a few simple tricks, such as disallowing strings whose second and third characters were punctuation characters—using the library function *ispunct( )*—could improve performance significantly. **PC**

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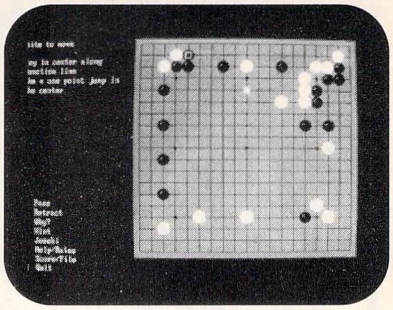

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INTRO DOS

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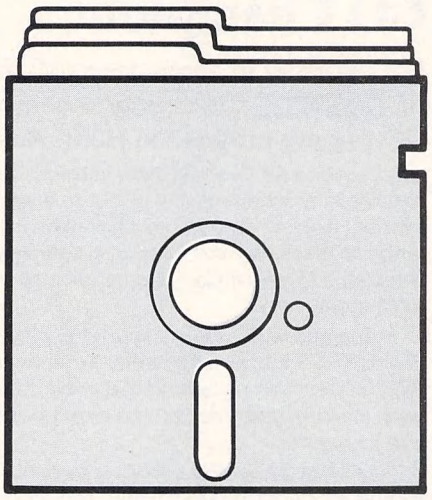
Tony Roberts



An orderly computer system is a joy: Files and programs are in their proper places, and there's nothing extraneous to clutter directory listings.

It's easy to imagine such a system, but it takes continuous effort to maintain one. Mysterious files have a way of multiplying, both on floppy and hard disks, and unless you have some way of identifying them, you'll be reluctant to throw them out.

What's in That File?

Conventions for naming MS-DOS files have evolved over the years. If you understand the conventions, you can get clues about a file from its extension.

Files that end with .COM or .EXE are programs. Although both types of file act the same way from the user's viewpoint, the computer recognizes a difference. Essentially it's a matter of memory usage. A .COM, or command, file is restricted to one 64K segment of memory for the program and its data area. An .EXE, or executable, file can control larger blocks of memory.

Files ending with the .SYS extension are often device drivers (some device drivers use a .BIN extension). These files provide your system with specific information on how to handle various monitors, keyboards, printers, ramdisks, spoolers, and so on. Device drivers are usually added as you enhance your system. If you buy hardware or software that requires a device driver, the product's instructions will tell you how to install the driver.

Next come batch files—user-created files that automate command sequences. These files end with the .BAT extension.

The file extensions listed above can be found on any MS-DOS system. They're part of the system and are unchangeable. File extensions for user-generated data, however, are more flexible.

Some applications allow you to choose your own extensions; others add file extensions for you. If the program gives you the choice, you can devise your own system to help you manage your files. You might use the extension .LTR for your letter files, .MEM for the memos you've written, .TXT for text files, and so on. If you're methodical and consistent, you'll have a much easier time keeping your disk in order.

If your program adds its own extensions, check the manual to learn exactly what they are. Borland's *Reflex* database-management system, for example, uses several extensions: .RXD for database files; .RXC for cross-tab–specification files; .RXP for graph files; .RXR for report-specification files; .RXT for translation-specification files; and .PRN for files printed to disk. If you're familiar with just what these extensions mean, you'll be able to decide which files you can safely delete when you're doing your disk housekeeping.

ASCII Anyone?

Disk files are stored in a variety of formats. The easiest format to deal with is ASCII, which stands for American Standard Code for Information Interchange. ASCII (pronounced AS-key) is a system for representing letters and numbers in computer memory. It's a common denominator among the various programs, disk formats, and computers.

Most of today's application programs have some ability to produce and receive files in ASCII form. This data may be text from a word processor, a mailing list from a database, or financial information from a spreadsheet. Once it's saved on disk in ASCII, other applications can read the common language and make use of the information. For example, you could use the mailing list generated by your database program with the mail-merge function of your word processor to send out a mass mailing.

ASCII also makes it possible to change application programs without losing all of your previous work. Perhaps you want to begin using a new word processor but its file structure is incompatible with your old program. First, use the old program to save important files in ASCII; then load them into the new program and resave them in the new program's format.

You're likely to lose some of your work in this process, since features such as boldface and underlining will probably not convert to ASCII, but at least you'll have the bulk of your work intact.

Inspect a Bit

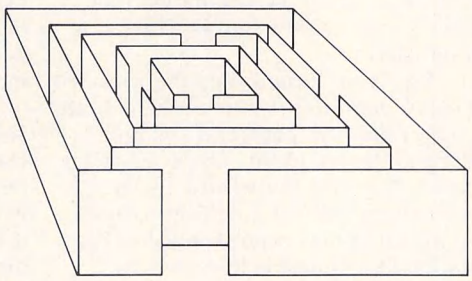
Back to your disks. If the mystery files on your disk are ASCII files, you can study their contents easily using the DOS TYPE command. Enter the command TYPE *filename*, and the text of the file will scroll across your screen. Press Ctrl–Num Lock or the Pause key to pause the display.

Figuring out what's in non-ASCII files is more difficult. If you try to use the TYPE command, you'll probably be treated to a display of strange characters and a cacophony of beeps and squeaks. Some file-reading utilities allow you to display non-ASCII files more successfully, but it's still tough to decode the mishmash of characters that dance across the screen.

Tom Campbell's *Snooper* utility, discussed in this issue's "Programming Power" column and included on the disk, is just what you need. This utility zips through program files and prints ASCII strings stored inside a program. Running *Snooper* provides you with information such as copyright notices, error messages, and help screens.

Armed with some basic knowledge of file types, you'll be able to determine the purpose of the mystery programs that appear on your disk, and you'll be able to keep your disks uncluttered without worrying that you've deleted something valuable. **PC**

GAME ROOM



A Grazing Mace

Harry Bee

I've come to the conclusion that Spectrum HoloByte's *Soko-Ban* is the best maze game ever. This conclusion of great moment started me thinking about mazes, maze games, and mazes in games. A few steps in that direction and, lo, I found myself on a quest for the best maze found in a game. It's a quest that promises to last awhile. The universe of computer games is chock-full of the things.

Mazes—Real and Imagined

Ever since the original *Adventure*, text adventures have been obliged to include a maze. One game that didn't was Infocom's *Moonmist*, which had more justification than most others to have one, since the story takes place on an English country estate—an obvious setting for a hedge maze if ever there was one. But *Moonmist* lacked more than a maze, and I'm not here to bash it more than it's been bashed already.

Text mazes come in two flavors—mappable and unmappable. Escape from the unmappable kind depends on your solving a puzzle or correctly using found objects (in the best of them), or on dumb luck (in the worst). The mappable kind—once you've diddled down every dead end—turns out to be a traditional, garden-variety maze with one continuous path from start to finish.

You can find a splendid, garden-variety maze—the hedge maze missing from *Moonmist*, in fact—behind the garden behind Buddy Burbank's mansion in Infocom's *Hollywood Hijinx*. This maze ranks high because the game early on gives up a map of it—a schematic detailed enough to cut in half the number of mapping moves you need to make.

Let's face it: Mapping a text maze is tedious, and any help is a boon. Only the most stubbornly fanatical adventure gamers—the same folks who enjoy Brussels sprouts—really enjoy the process. The rest of us put up with the labor because it's the only way to get to the good stuff: the puzzles. So as much as I like a good, old-fashioned maze, I have to admit that the unmappable (or barely mappable) puzzles passed off as mazes work better than real mazes in text adventures.

That said, I'm going to nominate for the title of Best Unmappable Maze the one in Infocom's *Bureaucracy*. (It's hard to talk about text adventures without talking about Infocom.) As is the case with others of its kind, until you solve its puzzle, you'll wander in north/south/east/west limbo for either the rest of your days or all eternity, whichever comes first—unless, of course, you get very lucky.

The puzzle's solution, without giving too much away, depends on a computer you've been lugging around since the beginning of the game, some unusual software, and a penchant on your part for cryptography. What raises the puzzle above others is that it's both challenging and fair. Fairness is something I insist on in a puzzle, whether it's on a computer or elsewhere. To my mind, the need to bumble about until you fall out of the bottom of an obstacle blights too many text adventures. *Bureaucracy*, happily, is an unblemished game full of challenging puzzles that are fastidiously fair.

By the way, if you're a Douglas Adams fan and you passed over *Bureaucracy* because of a bad experience with the computer version of *Hitchhiker's Guide to the Galaxy*, come back. *Bureaucracy* is not only worthy of Adams' byline, but it may also be the funniest text adventure in existence.

Doomed?

Until recently, I hadn't thought to question how long it was going to take for all-text adventures to follow the condor into virtual extinction. I like text adventures. I cut my computer teeth on an original TRS-80 and trekked through Models III and 4 before finding my way to a PC compatible and graphics. Stretching a point, TRS-80s had graphics, but the pixels were as big as your thumb, and the arcade games that were available for the machines were laughable—and embarrassing, when your friends with Apples and Commodores got a look at them. So I learned to love text.

In fact, my first flight simulator was an all-text affair:

The power of your 200 horsepower Wright-Curtiss reciprocal engine is palpable as you climb at a steady five-hundred feet per second into a china blue sky. To the west the familiar John Hancock building accents Chicago's skyline. To the east Lake Michigan stretches wide as an ocean. Your heading is zero degrees. Behind you Meigs Field's single runway falls away to the south like an autumn leaf.

Move?

Until you've done that kind of instrument flying, you haven't flown. And after you've done it, even the stark world of *Chuck Yeager's Advanced Flight Trainer* looks glorious. So what's wrong with adding graphics to text adventures?

Game designers have been attaching pictures to text adventures for a while now. While some of the art has been pretty to look at, it's seldom served a purpose beyond pure window dressing. DataSoft's *Dark Lord*, a decent enough little game, comes to mind as an example of superfluous graphics. If the text points out the objects you need, what's the picture for?

I guess the reason for pictures is the accurate belief that graphics sell games. (Another reason is to attempt to make an awful game somewhat palatable. *The Hobbit*, from Addison-Wesley, is a prime example.) But since I don't want or need an illustrated *Zork* any more than I want or need an illustrated copy of Anne Rice's novel *The Vampire Lestat*, I've been everything from unimpressed to annoyed by pasted-on pictures that take extra seconds to display.

Having made up my mind in that regard, I turned to Mindscape's *Uninvited*, and my resolve dissolved in the face of pictures that not only illustrate, but advance the plot. The story—which involves being trapped in a horrifically haunted house in the company of a ghastly assortment of ghosties, ghoulies, and other not-quite-dead characters—could have been a text adventure, even an illustrated text adventure, and a pretty good one in the right hands. Instead, it's something completely different—a pictorial adventure, I suppose—and it works.

While there's a scrolling narrative

in *Uninvited,* the pictures are anything but add-ons. You use them to play the game—indeed, you *have* to play with them. As I understand it, *Uninvited* originated as something called a *Mac-adventure* in the nonverbal world of the Macintosh. So instead of typing your moves, you select a verb from a menu by pointing and clicking on it. (You don't need a mouse; a joystick or the keyboard does as well.) Then you select a noun by finding it in the picture of the room you're in, pointing to it, and clicking again. Instead of typing *Read the book,* you click on the Examine box and again on the book that's on the table next to the fireplace.

That's not all the nonverbal communication that goes on in *Uninvited.* Whenever you open something, you get to see what's inside in a separate window—that's a window in the computer sense, not the architectural sense. And when you want to take something, you point to it and drag it into the inventory window that serves as your pockets and knapsack. Finally, *Uninvited*'s soundtrack and speech synthesis are startling, too, since all it uses is the sound generator built into your PC.

Do I hear groans from the group of veteran text adventurers over in the corner? You're right. You've suffered through the worst of primitive command parsers that understood only such sparkling repartee as *GO STAIRS.* You've come to take a special pleasure in communicating with programs that understand *Pick up the cudgel and beat up the troll with it. Then run to the chimney and scream "Murphy!"* Anything that can make sense of something like that is easy to love. And now, with the attack of the graphics interface, windows, pull-down menus, and mice, you're back to *Me, Tarzan. You, Jane.*

Relax. In its own right, *Uninvited* is a pleasure. But there's only so much you can do by pointing and clicking. That's why language replaced grunts and gestures in the first place. Your parsers are safe.

Lost Labyrinths

I've digressed. There's no maze to speak of in *Uninvited.* There is one in Paragon Software's *Wizard Wars.*

Wizard Wars, a fantasy role-playing adventure, hasn't gotten much attention since its release in mid-1988. True, its graphics, situations, plot, and scope can't compare with standards set by such epics as *Wizardry* and *The Bard's Tale.* On the other hand, you can play the game without having to make a sunup-to-sundown commitment to it. And you don't have to hack your way through ever-larger hordes of pesky gnomes and accumulate zillions of points to advance to the next incremental level the way you do in many a fantasy adventure. (To be honest, I never moved on to the sequels of *The Bard's Tale,* as good as it is, because "you face death itself in the form of 50,000 hobbits," and the ensuing hour-long carnage finally wore me out.) *Wizard Wars,* in spite of flaws that committed role players won't abide, moves along at a good pace.

Briefly, in *Wizard Wars* the wicked mage Aldorin has disrupted the delicate balance between good and evil and plunged the world into chaos, as you'd expect. You play the wizard Temeres, who, along with all the other wizards in the world, has been stripped of his powers. Your quest is to search the world for the means to regain your power and gain the wisdom and experience you need to cross the three dimensions to the ultimate confrontation with Aldorin. Take a breath.

Wizard Wars' second dimension is a seven-level, three-dimensional maze. If you're someone who enjoys mapping mazes, this may be as close to nirvana as you're likely to get. You start with an ordinary maze on one level and then, after you've been blasted by an endurable number of goblins, gargoyles, and other petty irritants, find your way to the first master, a fellow wizard gone astray. Defeat the master and your reward is a second level added to the first, two new directions of movement (up and down), and another master to find and best. As the maze grows to its full seven levels, where you find the portal to the third dimension, it remains a working maze where all the corridors fit.

Yet as awesome an edifice as the maze becomes, it plays a minor role in the game itself. Typical of role-playing adventures, the road traveled isn't nearly as important as the encounters along the way. Mazes and other puzzles are incidental to the acquisition of power enough to meet the game's final test. So, as good as the maze in *Wizard Wars* is, I'm still looking for the perfect game maze. That's fine. It gives me something to do.

Warehouse, Man

And it gives me time to get back to the Japanese import *Soko-Ban,* the best maze game ever. The site of the game's mazes, 50 of them, is a warehouse. Each floor of the warehouse is a maze of corridors and halls, and scattered about each maze are a number of storage containers. The task at hand is to straighten the place up by moving the containers into their proper places, usually together in one room.

Two problems: The containers, which are the kind longshoremen load aboard transoceanic freighters, are as wide as the corridors you need to move them through. And your soko-ban, or warehouseman, who will do all the hard work under your direction, is a robot of limited ability. It can turn, move forward, and push, but it can't move backward or pull.

Close your eyes and imagine a maze with movable walls, but walls movable in only certain directions depending on the paths available at the moment. The wrinkle adds a chesslike or, more properly, a go-like depth to *Soko-Ban*'s mazes. In order to solve them, you have to visualize, all at once, the solution to the current maze, the effect of any moves you might make, and the solutions to a series of resulting mazes. If that prospect makes your heart sing, add this game to your library, while I go off on my quest for more games to play.

Harry Bee is a freelance writer, professional puzzle builder, programmer, and experimental musician who's been publishing articles about personal computers for nearly ten years. He can usually be found at his home in Cornish, Maine, playing the latest PC games.

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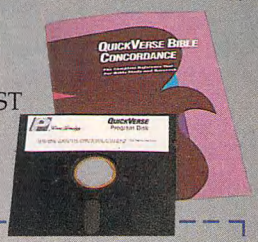

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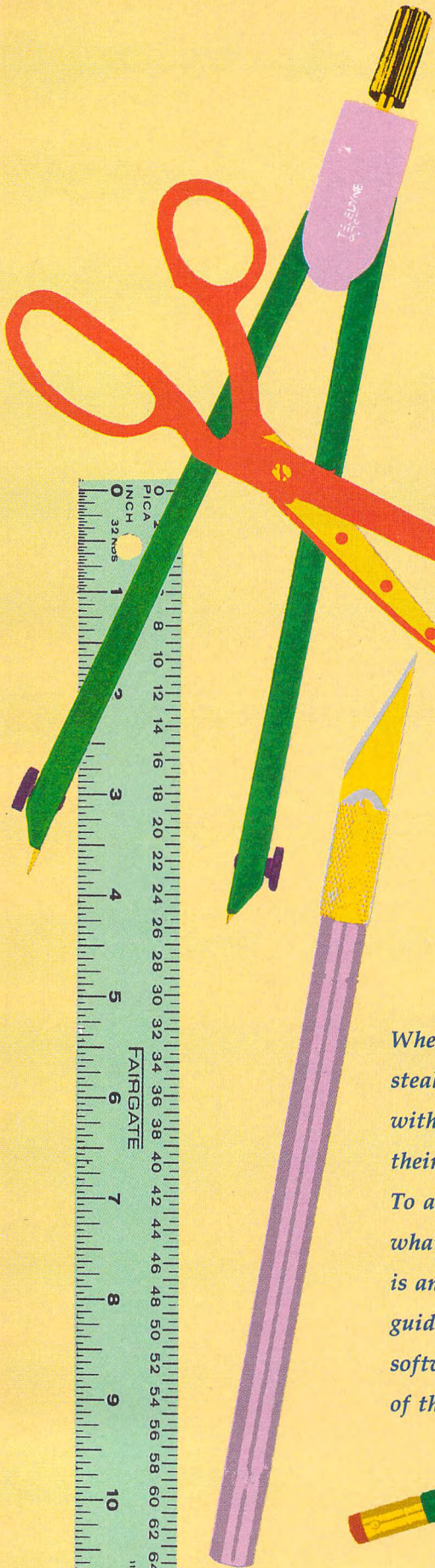


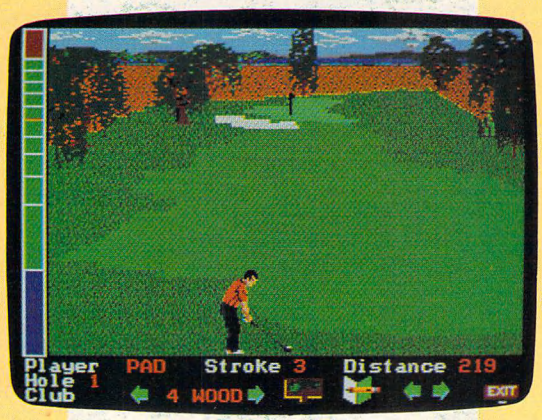
Game Designers' Favorite PC Games

When game designers steal a few minutes to have some fun with their PCs, what games do they play? Do they play their own games, the competition's latest, or a software classic? To answer this question, we asked five top gamesmiths to tell us what their favorite games are and why they like them. The result is an entertaining, irreverent, no-holds-barred guide to the best in PC entertainment software—the hottest of the hot.

Shay Addams

Al Lowe

Al Lowe wrote Leisure Suit Larry I and II and contributed to King's Quest IV.



Right now my favorite IBM game is Mean 18, *the golf game. I like the three-dimensional graphics, and it's the only way I can play a round of golf.*

— Al Lowe

Lowe: Right now my favorite IBM game is *Mean 18,* the golf game. I like the three-dimensional graphics, and it's the only way I can play a round of golf. I can't even seem to hit the ball when I get out there with a real club.

COMPUTE!'s PC: You do better at computer golf than on a real golf course?

Lowe: Far better.

COMPUTE!'s PC: In an average week, how much time do you spend on the *Mean 18* fairways?

Lowe: A half-hour or so; I'm not real big at it. My favorite course is Pebble Beach. I come in around 80 or 82. A few times I've got it down to 70, but I've never broken par. With a real golf ball, though, I'm into triple figures.

COMPUTE!'s PC: Is that your favorite kind of game?

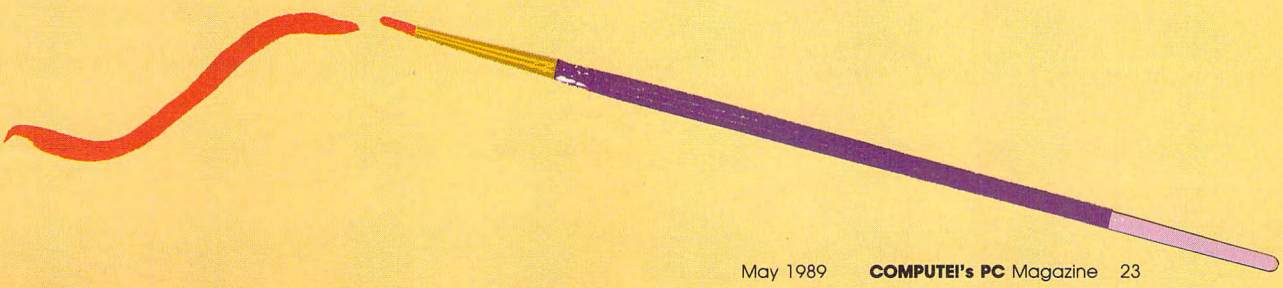
Lowe: No, I used to really like *Lode Runner* and other eye-/hand-coordination games. And Microsoft's *Flight Simulator* 3.0, if that's a game, or a way of life. I usually horse around with it—just take off, fly around the building, and land. But *Mean 18*'s the one I'm currently on.

COMPUTE!'s PC: Do you think the fact that you write fantasies like *Leisure Suit Larry* has anything to do with your preference for playing realistic games such as *Mean 18* and other simulators?

Lowe: Yes, it's a reaction to that. I think people, for fun, do things they don't do at work. If it were more of the same, it wouldn't be a release.

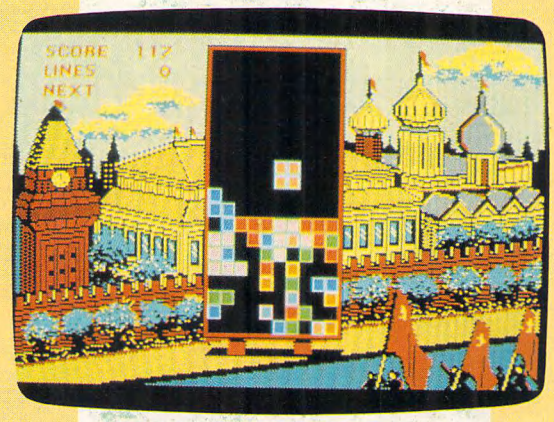
COMPUTE!'s PC: How do you go about choosing a new game to play?

Lowe: I go to shows and software stores to stay current with what's available. And SPA (Software Publishers' Association) members send copies of their games to each other, so we get to see what other companies are doing. But word of mouth counts a lot: That's how I got onto *Mean 18,* when someone strongly recommended it as having very good EGA graphics. I know this is terrible for an adventure-game writer to say, but I never really got into the Infocom games. They never held my attention. I spend a lot of time reading, so it's more fun not to have to read while playing a game. ▷



Jon van Caneghem

Jon van Caneghem wrote Might and Magic I and II and is president of New World Computing.



Tetris *is just an addicting game. . . . It's one of those games that anyone can walk up to and play in two minutes and be right up to competing with everyone else.*

— Jon van Caneghem

van Caneghem: The two that I play the most right now are *Advanced Flight Trainer* (the Chuck Yeager thing) and *Tetris*, the Russian game. I like them because, between assemblies or compiling or whatnot, I need something I can play for ten minutes or less. Very few fall into that category, but those two are real quick.

COMPUTE!'s PC: You like *Flight Trainer*, then, because it doesn't take you long to crash and burn?

van Caneghem: Right [laughs]. I can play around a few minutes, crash, and go back to work. And *Tetris* is just an addicting game. Everyone in the office plays it, and we even had a big competition on it. It's one of those games that anyone can walk up to and play in two minutes and be right up to competing with everyone else. The pace around here is so rapid that sitting down to play any lengthy game is something that just doesn't happen. Oh, another game I liked was *Futuremagic*. The EGA graphics kept pulling me back, even though the game was poor. (People are starting to do some really nice EGA graphics.) It was really slow-moving, though, so I cheated: I gave myself like a million of everything and finished it in an hour!

COMPUTE!'s PC: So you don't get to play a lot of games just for fun?

van Caneghem: Not lately. I used to play everything to death.

COMPUTE!'s PC: How much time do you get to spend playing *Tetris* or *Flight Trainer?*

van Caneghem: Maybe ten minutes every other day. An hour a week at the most. If I had the time, I would play more games. But I spend at least three hours a week looking at other people's games to see what they're up to.

COMPUTE!'s PC: How do you go about finding a new game just to play?

van Caneghem: Any game that's advertised or talked about a lot in columns or reviews. We scan every inch of each magazine that comes in to see what everyone else is doing—that's one of the things we try to stay on top of. So when something new or exciting or in a field we want to get into is released, we usually get hold of it and try it out. Doing this kind of research, you want to be able to see as many facets of the program as possible, so again, we often cheat in order to do so. If we played a role-playing game legally, it might take 50–100 hours to reach the end or the interesting screens or neat little features you might see at various points near the end of the game. We can't spend hours doing that, so we cheat a bit.

Brian Fargo

Brian Fargo is president of Interplay Productions. He produced Wasteland and the Bard's Tale series.

The most fun I've ever had playing an IBM game was with Starflight. *It was conceptually neat, the first real space role-playing game that was any good.*

— Brian Fargo

Fargo: I play so many games, I'll have to think a minute. . . . Let's see, the most fun I've ever had playing an IBM game was with *Starflight.* I really had a lot of fun with that. Luckily we had a system that was fast enough to keep it enjoyable, but I sat there with another guy on weekends, playing late, late hours, and had a great time. It was conceptually neat, the first real space role-playing game that was any good. And the way they did the traveling through the universe part gave it a feeling of vastness, which I think is most important in a game about space. For me, that's the big turn-on, the idea of traveling through and exploring space, going where no man has gone before and that sort of thing. The atmosphere was excellent. Currently I'm playing *King's Quest IV.* Yeah, yeah, I'll admit it—I like the animation and the graphics. That's what usually gets me into Sierra's games—all the clever little sequences. And Roberta helps you out if you get stuck. [Roberta Williams designed the King's Quest series—Editor.]

COMPUTE!'s PC: You seem to play the kind of games that you develop at Interplay.

Fargo: Absolutely. I don't play many sports games, simulators, or action games. I mostly play storytelling games, and the reason is twofold: I enjoy it, and I learn so much about what works and what doesn't. If there's an area in a game that gets me real frustrated, I'll make a note not to do anything like that in my next game. And it helps you break new ground when you design your next product. I've played everything, or as much as I could, so I know what *different* means.

COMPUTE!'s PC: Do you actually complete many role-playing games?

Fargo: I certainly don't complete each one, but I put three or four hours into it until I understand the basic mechanics and get a feel for what the game's about.

COMPUTE!'s PC: Did you finish *Starflight?*

Fargo: Yes. But lately there haven't been many that pull me all the way through. The game I'm going to play next is *Battletech,* because it looks different. It's Infocom's first role-playing game, so I want to see what they come up with. But if it draws me into the story, I'll probably finish it. And *Battletech* supports EGA. I prefer to play games like that, since it's hard to go back to CGA after seeing good EGA graphics.

COMPUTE!'s PC: How do you go about finding a new game to play?

Fargo: Word of mouth is the most important thing. After that, it's either a topic that really interests me or something done by a group whose work I respect. If it's from someone new, I'll look for a review or ask for other people's opinions. But I mostly look for topic. ▷

Dave Murry

Dave Murry co-wrote (with Barry and Dee Dee Murry) Ancient Art of War, Ancient Art of War at Sea, and Manhunter: New York. He speaks for his colleagues in this interview.

Murry: What do I play when I have time to play? I like the *Flight Simulator* 3.0. And *Lode Runner* because it's an action game, but one that makes you think a little bit: You have to decide where you're going to dig a hole and how you're going to get down to the treasure chests. *Crossfire* [now out of print—Editor] is an old one that we like a lot. There's *Karateka*, the karate game, and *Leisure Suit Larry*. And *Thexder*, the Japanese arcade game.

COMPUTE!'s PC: If you could only play one of those, which would it be?

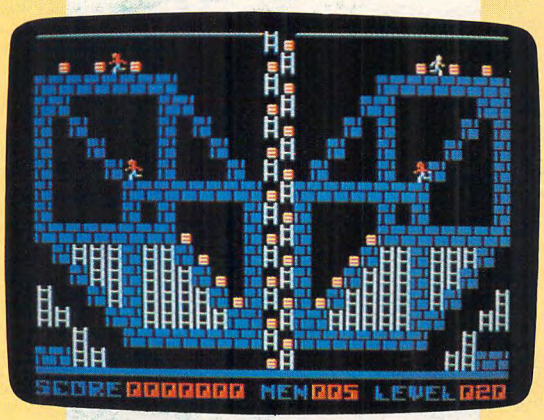
Murry: Probably *Crossfire*. We usually want to play a game that's quick. We want to put our minds to rest for a while and just click away at the game. That's why *Crossfire*, a shoot-'em-up from the early eighties, would be the first choice.

COMPUTE!'s PC: You're best known for *Ancient Art of War*. Why didn't you name a war game among your favorites?

Murry: We spend all day designing war games, so we're looking for something different when we play for fun.

COMPUTE!'s PC: Do you get to spend a lot of time playing for fun?

Murry: Not very much. We get a lot of them and play them for a little bit, and then I guess the acid test is whether or not we come back to them. Usually we don't, but the ones I mentioned are the ones we've played quite a few times—which means we must like them.



I like. . . Lode Runner *because it's an action game, but one that makes you think a little bit: You have to decide where you're going to dig a hole and how you're going to get down to the treasure chests.*
— Dave Murry

COMPUTE!'s PC: What appealed to you about the *Leisure Suit Larry* adventures?

Murry: That was just more for the humor: We liked some of the things they did in there. And we had the hint book, so we didn't have to solve all the puzzles—we could just run through and have a lot of fun. It was quite a bit different from other games out there.

COMPUTE!'s PC: Graphically, which does the most for you?

Murry: We were impressed with *Karateka*. It had real smooth graphics and a feature that shows you what's going on somewhere else. *Thexder* is pretty good in that sense, too. It has a lot moving on the screen, which really takes the IBM to its limits as far as speed of the graphics.

COMPUTE!'s PC: How do you go about choosing a new game to play?

Murry: We read the magazine reviews first. And if it sounds good there, we'll probably buy the game and check it out.

COMPUTE!'s PC: How much time do you spend just playing for fun?

Murry: I probably put in a half-hour a day. Usually when we're done programming at the end of the day, I slip in a game and play awhile. ▷

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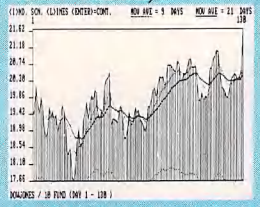

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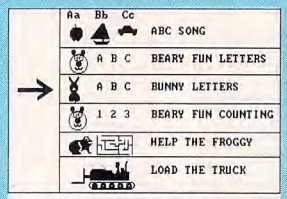

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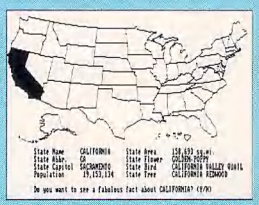

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Noah Falstein

Noah Falstein is the designer/programmer of Lucasfilm's H. M. S. Pegasus, and he was project coordinator of Battlehawks 1942

I've enjoyed Rocket Ranger *recently. I tend to be a fan of pure design, and I like the way the game's strategic level is integrated with the arcade level.*
— Noah Falstein

Falstein: I've enjoyed *Rocket Ranger* recently. I tend to be a fan of pure design, and I like the way the game's strategic level is integrated with the arcade level. The graphics are very nice, but I almost expect good graphics in everything now. And the design of *Rocket Ranger* is what *Defender of the Crown* wanted to be but didn't have time to be. It has that balance of moving around on the map and making strategic decisions, then having your little tactical arcade games in the middle of it, and it meshes nicely on that level. If it were just arcade sequences, I don't think I'd enjoy it. I really like the planning aspect, having to figure out where to go next. And I've played the Commodore 64 version of *Red Storm Rising* and look forward to the IBM version.

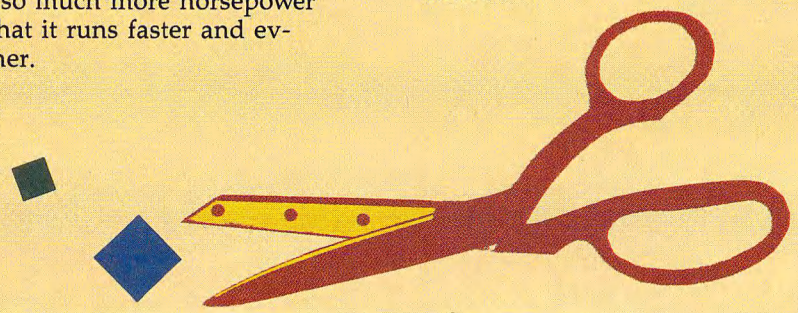
COMPUTE!'s PC: If you've already played it on one machine, why should you want to play the IBM version?

Falstein: Partly because I know they've added new features (talked about in the manual) that aren't in the Commodore version. And partly for the better graphics, since the IBM game will have higher resolution. MicroProse has a reputation for that: *Gunship* on the C64, for example, is nowhere as exciting as it is on the IBM, because they really upgraded the graphics. And with an AT, you just have so much more horsepower than with a C64 that it runs faster and everything is smoother.

I enjoyed *Starflight* because for that time they did a lot with the scope of the game. It was quite impressive as to the ground it covered. *Ultima IV* was like that: You could do a lot of things within the game. It's almost many games in one but they're all integrated into the same purpose. Everything you do hooks into something else you do. I also like *Modem Wars*, because I like being able to play against another person. If I had to choose just one game, it would be *Modem Wars*, for that reason. I also like the fact that, even though there's a lot of fast-action stuff going on, you really need a high level of strategy to do well at it.

COMPUTE!'s PC: How much time do you get to play games just for fun?

Falstein: Probably an average of 4 hours a week. I often don't have the luxury to play as much as I'd like. I spent about 40 hours on *Ultima IV* and got about a third of the way through. That was a lot more time than I could afford, but I was just enjoying it so much. ▷



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Fast Features:

Game Designers' Favorite PC Games

Game	Publisher	Price	Systems	Memory	Graphics	Input	Comments
Chuck Yeager's Advanced Flight Trainer	Electronic Arts	$39.95	PC, XT, AT, Tandy (not PCjr)	256K	CGA, EGA, Hercules, Tandy 16-color	Mouse or joystick optional	Not copy-protected
Flight Simulator 3.0	Microsoft	$49.95	PC, XT, AT, PS/2, Tandy (not PCjr)	256K	CGA, EGA, MCGA, VGA, Hercules	Mouse or joystick optional	Not copy-protected
Futuremagic	Electronic Arts	$49.95	PC, XT, AT, Tandy (not PCjr)	256K	CGA, EGA, Tandy 16-color	Keyboard	Not copy-protected
Karateka	Brøderbund	$34.95	PC, XT, AT, Tandy	128K	CGA	Joystick optional	Copy-protected
King's Quest IV	Sierra On-Line	$49.95	PC, XT, AT, Tandy (not PCjr)	Two versions: 256K and 512K	CGA, EGA, Hercules, Tandy 16-color; 8-MHz processor, EGA, and hard disk recommended for 512K version	Mouse or joystick optional	Supports Roland MT-32, Ad Lib, and IBM music cards
Leisure Suit Larry I	Sierra On-Line	$39.95	PC, XT, AT, Tandy, PCjr	256K	CGA, EGA, VGA, Hercules	Joystick optional	Not copy-protected
Leisure Suit Larry II	Sierra On-Line	$49.95	PC, XT, AT, Tandy (not PCjr)	512K; 8-MHz processor and hard disk recommended	CGA, EGA, MCGA, VGA, Hercules, Tandy	Mouse or joystick optional	Supports Roland MT-32, Ad Lib, and IBM music cards
Lode Runner	Brøderbund	$34.95	PC, XT, AT, Tandy	128K	CGA	Joystick optional	Copy-protected
Mean 18	Accolade	$39.95	PC, XT, AT, PCjr	256K	CGA, EGA, Hercules	Joystick optional	Copy-protected
Modem Wars	Electronic Arts	$39.95	PC, XT, AT, Tandy (not PCjr)	384K	CGA, EGA, VGA, Hercules, Tandy	Mouse or joystick optional	Not copy-protected
Red Storm Rising (specifications tentative at press time; game due to be released spring 1989)	MicroProse	Undetermined	PC, XT, AT, Tandy	384K	CGA, EGA, VGA, Hercules, Tandy	Joystick optional	IBM and Innovations sound boards supported
Rocket Ranger	CinemaWare	$49.95	PC, XT, AT, PS/2, Tandy; AT recommended	384K	CGA, EGA, VGA	Joystick optional	Not copy-protected
Starflight	Electronic Arts	$49.95	PC, XT, AT, Tandy (not PCjr)	256K	CGA, EGA, Hercules, Tandy	Keyboard	Not copy-protected
Tetris	Spectrum HoloByte	$34.95	PC, XT, AT, PCjr	256K	CGA, EGA, Hercules, Tandy (sold separately)	Joystick optional	Not copy-protected
Thexder	Sierra On-Line	$34.95	PC, XT, AT, Tandy, PCjr	256K	CGA, EGA, VGA, Hercules	Joystick optional	Not copy-protected
Ultima IV	Origin	$59.95	PC, XT, AT, Tandy	256K	CGA, EGA, Hercules, Tandy	Keyboard	Not copy-protected

For more information about the products discussed in this feature, contact the publishers at the addresses listed below:

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San Jose, CA 95128

Brøderbund
17 Paul Dr.
San Rafael, CA 94903

CinemaWare
4165 Thousand Oaks Blvd.
Westlake Village, CA 91362

Electronic Arts
1820 Gateway Dr.
San Mateo, CA 94404

MicroProse
180 Lakefront Dr.
Hunt Valley, MD 21030

Microsoft
16011 NE 36th Way
Box 97017
Redmond, WA 98073-9717

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Building B
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PC

Supercharge your PC—it's as easy as 1-2-3

George Campbell

With lightning-fast speeds that leave floppy drives in the dust and the ability to store the equivalent of over 60 disks' worth of data, a hard drive can blast humdrum, everyday computing into the fast lane.

If you're using a floppy-based PC, you may have considered adding a hard disk to your system. You won't be sorry if you do. Your PC will not only run much faster, but you'll end the chore of finding and swapping floppy disks. A hard disk also opens up a new world of software that requires a hard disk's speed or storage capacity to run.

Just a few years ago, a hard disk was an expensive addition. Today, with hard disk drives available for less than $300, adding this valuable tool has almost become a necessity.

Before You Start

Before buying a hard disk, you need to make certain that a hard disk installation is possible. In most cases, adding a hard disk is simple, but there are exceptions.

If you have an early IBM PC, one that only accepts 64K of RAM on the motherboard, you can't install a hard disk without replacing the ROM BIOS. Unfortunately, IBM no longer supplies the upgraded ROM BIOS. If this is your situation, consider replacing your old PC.

Some computers don't have room for a hard disk. If this is true of your PC, consider a hard disk card that includes the hard disk and controller on an expansion card.

Some Tandy computers have another problem. Many hard disk controllers don't function in these systems. Make certain that the controller you buy will work in your Tandy.

Power supplies in some computers may not be adequate for the additional power used by a hard disk. This is true of the 67-watt power supply in the original IBM PC.

Since a hard disk requires a controller card, you also need to make sure that your PC has a free expansion slot. If not, you'll have to eliminate a card or buy a combination hard/floppy controller to replace your existing floppy controller.

Mounds of Megabytes

Choosing the best hard disk for your PC can be tough. You can choose a size ranging from 20 to more than 150 megabytes. The speed of hard disks varies, too. Then there is the price: from about $250 to over $1,000.

The way you use your computer should determine the size of your hard disk. If you're a typical home user, a 20- or 30-megabyte disk will probably suit your needs. A 20-megabyte drive can hold the equivalent of sixty 360K floppy disks.

Both 20- and 30-megabyte drives are available at reasonable prices. If you can afford the small difference in price, consider buying a 30-megabyte drive, just for the extra storage space. If your computing involves large data files or if you use scores of programs, you may need an even larger drive.

Speed is another factor. Hard disk speeds are measured by the average time it takes for the drive to find data. This time is measured in milliseconds and ranges from 85 down to 18 milliseconds.

Lower-priced drives, with access times of 65 milliseconds, are fine for XT-class computers. If you have an AT-class machine, you might want one of the faster drives. Unless you need a huge drive with fast access times, though, you'll probably find that one of the lower-priced hard drives will fill the bill and save money besides.

Take the Plunge

Once you've decided what your budget will allow and determined the type of drive you want, it's time to go shopping.

If you have an XT-class PC without a hard drive, you'll need the drive itself plus a hard disk controller. In this case, the best choice is a hard disk kit. These kits include the hard disk, a controller card, the hardware and cables you need, plus instructions. Buying a kit will also save money as compared to buying individual components.

If your computer is an AT or compatible, it probably already has a combination hard-and-floppy-disk controller. If the controller has two 20-pin connectors plus a 34-pin connector like the one in the photo, you're all set. All you need is the disk itself plus the cables. Otherwise, you'll need an AT controller card.

Drive It Home

Like most other computer hardware, hard disks are available from local dealers or from mail-order firms. For the lowest possible price, a mail-order firm will probably be the best choice, but it may not offer the instant support of a local dealer.

Use magazine advertisements for your initial shopping. If you decide on the mail-order route, call several companies to compare prices and availability.

Wherever you shop, you should ask the following questions:

- Is the drive in stock?
- If you are ordering an XT drive kit, does it include everything you need, including the drive, controller, cables, hardware, and installation instructions? Ask, too, if low-level formatting is included. This can save time.
- If you order a drive for an AT-class machine, ask whether cables and installation rails are included.
- Is there a telephone number you can call for technical support? Is the number toll-free?
- If the drive you order is larger than 32 megabytes, make sure that partitioning software is included with the drive.

Easy Installation

Installing your new hard disk drive should take less than an hour. It's a simple job and requires just a Phillips-head screwdriver.

Start by unplugging your PC. Remove all cables and set the monitor and keyboard aside. If the computer is in a cramped location, move it to a larger workspace.

Now, remove the case's cover. On most computers, this means removing five screws. Four are located in the extreme corners of the

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- ☐ **Arcade Games 1*** — Pac-man (3 versions!), Hopper, Space Invaders, Janitor Joe and others.
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- ☐ **Hercules Utilities** — A collection of utilities for Hercules graphics cards. Includes SIMCGA.
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Hard Disk Installation Checklist

- ☐ Make sure your PC can accommodate a hard disk.
- ☐ Determine whether you need a hard disk controller card.
- ☐ Choose your hard disk.
- ☐ Install the drive and card.
- ☐ If necessary, perform a low-level format of the disk.
- ☐ Run the DOS command FDISK to partition your hard disk.
- ☐ Run the DOS command FORMAT C:/S to perform a high-level format and install the system files.

back panel. The fifth is at the top center of the panel. (If your PC doesn't match this description, check your owner's manual.) Once the screws are out, slide the case forward.

With the cover off, locate an empty expansion slot near the drive bays. If necessary, relocate other expansion cards. Don't use the short slot near the power supply, since this slot is reserved in some systems. If you have an AT-class machine, your combination hard/floppy disk controller will already be installed.

Before handling the controller card itself or the hard disk, touch a grounded metal object to discharge any static electricity. Gently insert the controller card, pressing it firmly into the slot. Make certain that the card lines up properly and that the contacts are fully inserted into the card-edge connector. Now, install the screw which secures the rear bracket.

Next, install the hard drive cables on the controller. You'll find three sets of pins on the controller. Two of these have 20 pins. The other has 34 pins. The location of the connectors may vary.

Hard drives use two cables from the controller. Start with the narrower 20-wire cable. Plug the cable end onto the set of pins for drive C. This is the front or top set of pins. You'll see a red or blue stripe on your cable. This should be at the top or front, depending on your controller. Consult the controller's manual.

Now, install the 34-pin cable. There is only one set of pins for this cable. Again, the stripe on the cable should be at the top or toward the front of the computer.

Locate an empty drive bay for your hard disk. On XT-class computers, you may have to remove a front panel from the drive bay. Many case designs hide the hard disk behind the case. If your hard disk will not be exposed, remove the plastic front panel from the hard disk.

If your case doesn't expose the front of the hard drive, it probably has an LED to indicate when the drive is in operation. If so, plug the two-wire cable from the LED onto the appropriate pins on the controller card. Consult your controller's manual.

Now, route the cables through the drive bay. Plug the cables onto the card-edge connectors on the hard drive. Notice the slots on both connectors. The stripe on the cable should be on the side with the slot. The 34-wire cable may have more than one plug. For a single hard disk, use the plug on the end of the cable.

The Big Moment

Now, slide the hard disk into the drive bay. Always handle the drive gently. If you have an AT-class computer, plastic or metal rails on the side of the disk mate with grooves in the drive bay. Retaining clips secure the drive.

On XT-type computers, secure the drive in the bay with screws. Use the upper set of holes on the tabs at the sides of the drive. Use only the screws supplied with the drive, since longer screws can damage the drive.

If your drive bay doesn't have supports on both sides of the drive, mount the drive at the bottom of the bay. Rearrange other drives as necessary. If you mount it this way, you can reach the drive's lower mounting holes from the bottom of the PC's case.

Finally, plug the power cable into the drive's power connector. The rounded corners on the cable's plug mate with the rounded corners on the socket. If you don't have a free power plug, you'll need to buy a Y-connector.

Before closing up the case, look at the top of your drive. If there is a label listing defects, copy down the information. You may need it during formatting.

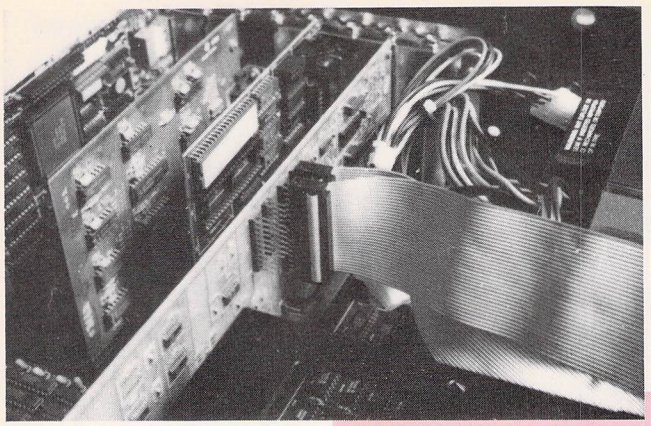
Check your cables to make sure they are properly aligned and completely engaged on the controller card and the hard disk. Route the cables carefully, making certain they won't interfere with the computer's case. Typically, you'll have to stuff them into the space behind the drive bays. Finish by replacing the cover on the computer.

Hardware Meets Software

Once the computer is back in its normal location, with all external cables attached, you're ready to format your new hard disk.

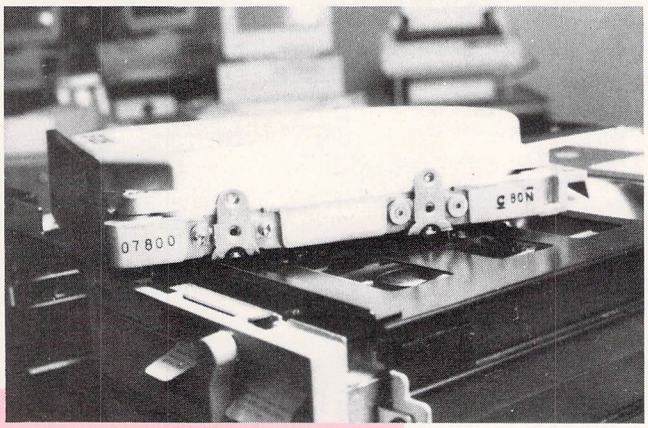
There are three steps required to ready a hard disk for use. The first is low-level formatting. This step links the hard disk with your controller, making it visible to your PC.

The next step is partitioning, which can divide the disk into several separate areas. The final step is DOS formatting. The following paragraphs describe the process one step at a time.



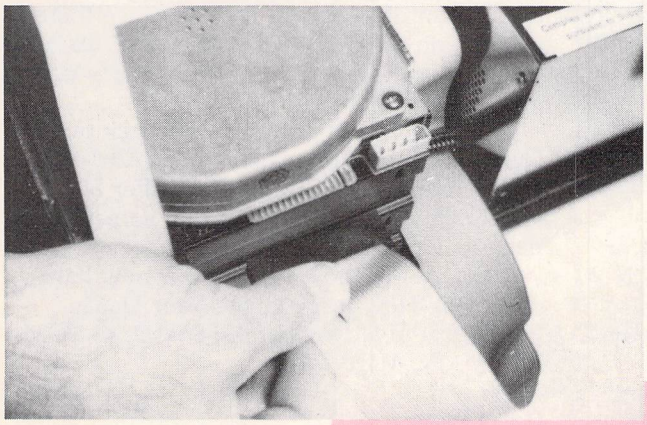
After you've installed the hard disk controller, attach the hard drive cables. The stripe on the cables should be on top. Use the front 20-pin connector for drive C. The locations of these connectors may vary.

1



For XT-type computers, mount the drive with screws. Use the upper set of holes on the tabs. Be sure to use only the screws provided with the drive to avoid damage. AT-type drives use side rails for installation.

2



When attaching the cables to the drive, note the location of the small slot on the connector. The stripe on the cable should be on the same side the slot's on. The small socket to the right is the drive's power connector.

3

Hard Disks by the Book

After you've installed your hard disk, you'll want to keep it performing at its best. There are several categories of programs that streamline hard disk management and keep your hard disk running fast and trouble-free. An excellent introduction to these programs is "Buyer's Guide to Disk Performance Software," in the November 1988 issue of *COMPUTE!'s PC Magazine.*

If you're interested in delving even deeper into the mysteries of your hard disk, meeting it on its own level and mastering its full potential, there are many good books worth exploring. Here are three that will quickly move you from novice class to power user:

The Hard Disk Companion, by Peter Norton and Robert Jourdain (Brady, 1987; 395 pages; $21.95), shows Peter Norton's ability to make technical information easy to understand. If you're interested in the nuts-and-bolts construction of your hard disk and its DOS environment, *The Hard Disk Companion* is hard to beat.

Hard Disk Management, by Stephen Fisher and Lynn Frantz (COMPUTE! Books, 1987; 426 pages; $18.95), is less technical than Norton's *Hard Disk Companion.* It concentrates more on the software you need to manage your hard disk. Detailed descriptions of products for security, performance, and backup, as well as an excellent glossary, make *Hard Disk Management* a first-rate starting place for novices.

Hard Disk Management in the PC and MS DOS Environment (McGraw Hill, 1988; 238 pages; $24.95) is a treasure trove of interesting and useful technical information for the intermediate- to advanced-level user. The volume includes a listing of all available hard disk drives and their specifications, information on OS/2 and PS/2, and details on hard disk–oriented DOS commands.

— Clifton Karnes

First, insert a DOS disk, version 2.1 or later, in drive A and turn the power on. If you have an AT-class computer, you'll also need to run the SETUP routine for your system, to add hard disk information.

To find out whether low-level formatting has already been done, give the command FDISK at the A> prompt (FDISK.COM must be on the DOS disk). If an error message appears on the monitor, you need to do the low-level format. If a menu appears, you can skip the next three paragraphs.

Low-level formatting initializes a hard disk, making it work correctly with your controller. The *HDtest* program on the March 1989 issue's disk makes the job simple.

If you see an error message, like *Drive not found,* when you run FDISK, use *HDtest* to perform the low-level formatting. Read the HDTEST.DOC file carefully before proceeding.

At one point while running the program, you need to enter a list of defects. That information is recorded on a sticker on the drive or on a separate sheet of paper. After you've used *HDtest* to perform low-level formatting, you're ready for the next step: partitioning your drive.

If your drive is a 32-megabyte or smaller drive, you'll want to make the whole drive into a single partition. For larger drives, you must create several partitions. That's what the FDISK program does.

If your drive is larger than 32 megabytes, consult your DOS manual's section on FDISK or see the instructions for the partitioning software supplied with the drive.

When you run FDISK, you'll see a menu. Select the first choice, Create DOS partition. Another menu will appear. Again, select the first menu option, Create Primary DOS partition. If you make a mistake, just press Esc.

Next, FDISK asks if you want to use the whole disk as the primary DOS partition and make the DOS partition active. Enter Y to continue. The drive light on your hard disk will come on briefly; then FDISK will ask you to put a DOS disk in drive A and press a key to reboot.

To make your hard disk usable by DOS, you must format it. Since you want to be able to boot up from the hard disk, give the command this way:

```
FORMAT C: /S
```

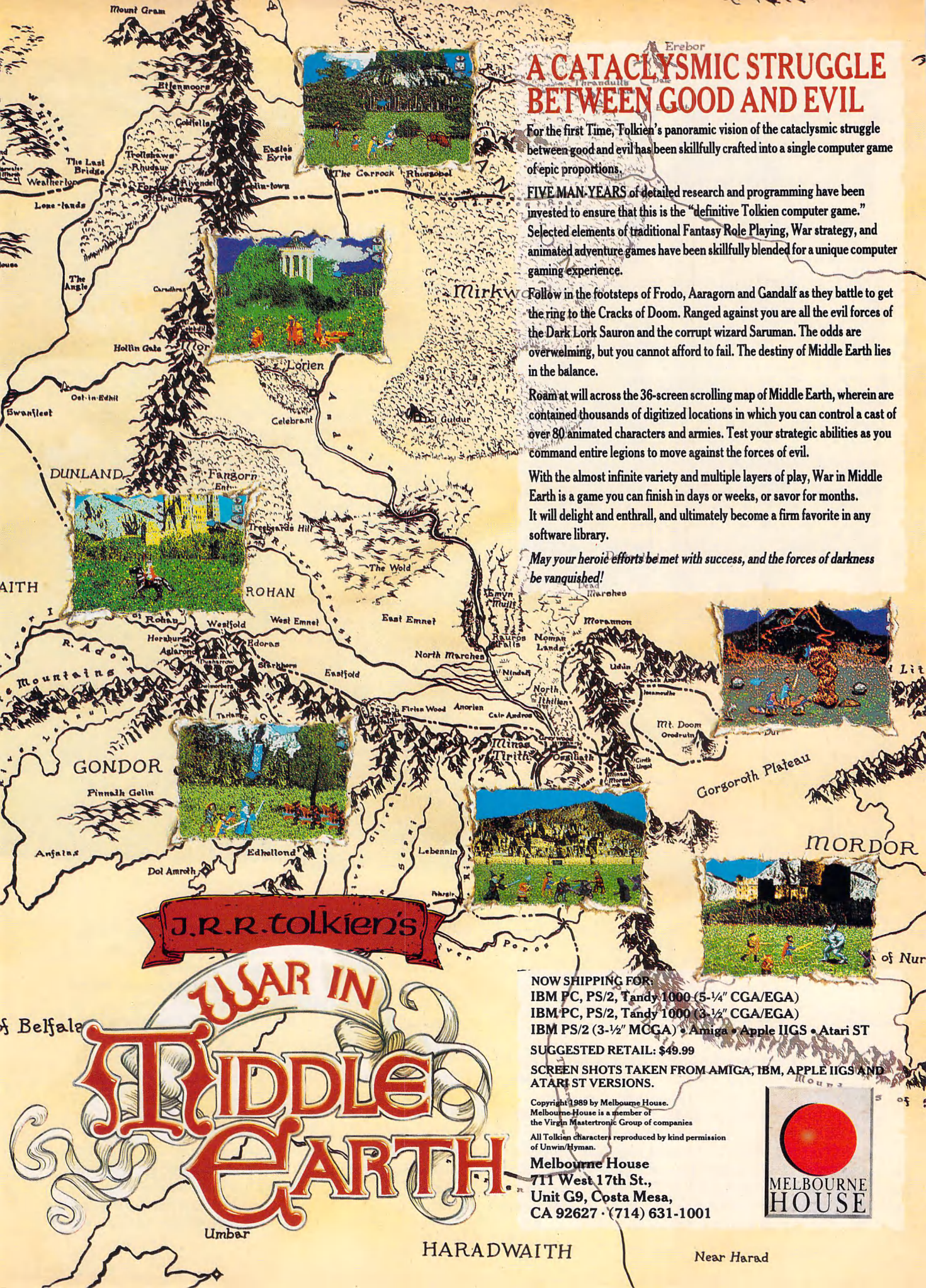
A warning will appear telling you that all data on drive C will be lost. Since there is no data on the drive yet, just enter Y to continue. Formatting a 20-megabyte drive takes about five minutes.

Once the formatting is done, remove the DOS disk from drive A and press Ctrl-Alt-Del to reboot. You'll see the familiar DATE and TIME prompts, followed by something new—a C> prompt.

For tips on how to use your new hard disk, see "How to Organize Your Hard Disk," in the November 1988 issue of *COMPUTE!'s PC Magazine.*

Don't Panic

If you've followed the steps shown here, but your drive doesn't work, retrace your steps, making sure all connections are correct. If you still have problems, call the technical-support number of the business where you bought the drive. **PC**



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MELBOURNE HOUSE

Games: 1999

Arlan R. Levitan

The PC—a *serious* computer? Prominent heavy-duty applications such as *Lotus 1-2-3*, *WordPerfect*, and *dBase* often lead people to assume that microcomputing is a very serious business. But consider the following.

Over a million and a half copies of personal computer–based flight simulator software are floating around in the wild blue PC yonder, the monthly sales of popular entertainment titles regularly outstrip those of big-name business packages, and tens of thousands of "serious" businesspersons would rather spend the afternoon with *Nobunaga's Ambition* than with this month's sales projections.

Computer-based gaming has ambushed the predictions of many industry analysts by becoming the fastest-growing segment of the software market for IBM PCs and compatibles. Dire predictions of the continued stagnation of entertainment software following the mid-eighties shakeout that saw many manufacturers drop out of the market have fallen by the wayside and proved to be groundless.

The simple truth is that humans, regardless of age or vocation, like to engage in play. As long as the variety and originality of the experience proffered to the public continues to mature and evolve to meet increasing player demands and expectations, the growth of computerized gaming will continue to accelerate.

Scotty Billings

FUTURE games

What will PC games be like ten years from now? If the advances made in the past decade are anything to judge by, future games will propel us into worlds beyond our wildest dreams. With keen insight and vivid imagination, Arlan R. Levitan and Keith Ferrell transform their PCs into time machines and journey into the future to give us two exciting—and very different—visions of what electronic entertainment may be like in the years 1999 and 2000. So fasten your seat belts, hold on tight, and shift your imagination into overdrive.

Power Micro

Much of the evolution of games over the last ten years is attributable to the increased computational, graphics, and data-storage power of microcomputers. In a little over a decade, we've progressed from crude black-and-white text-based games with little or no motion to diversions with 256 simultaneous on-screen colors and smooth animation. Still, some aspects of computerized gaming that have varied little over the years are due to undergo major transition. Those changes, augmented by the continued evolution of microcomputer capabilities, will drastically transform the nature of our involvement in play. A brief look back at where we stood in 1979 will help us set the stage for what to expect in 1999.

In the late 1970s, cutting-edge microcomputers were those equipped with 8-bit microprocessors

running at 1-MHz clock rates. Main memory of 48,000 bytes and a 140K floppy disk drive were more storage than anyone knew what do with. A 5MB hard disk was a luxury reserved for micro mavens willing to take out a second mortgage. Today, 25-MHz, 32-bit microprocessors with 1MB of main memory and 1.44MB floppies are rarely capable of raising a computer hobbyist's eyebrow, and 600MB CD-ROM drives cost little more than a middle-of-the-road video recorder.

As processing power, memory, and data storage evolve over the next decade, the capabilities of computer-based gaming will also grow to push the limits of available technology. By today's standards, the kind of entertainment software that fully utilizes the resources of a 625-MHz, 128-bit microprocessor equipped with 20MB of memory, 15MB floppies, and 72 billion bytes of mass storage may not seem readily apparent.

The More Things Change . . .

The types of games that we play on our computers will remain fundamentally the same. Millions of us will still be twitching reflexively as we slay slimy green nasties with sword or laser cannons. Others will continue to ponder mate in 6 or the Defense of Tobruk as erstwhile Chuck Yeagers push the computerized envelope and ersatz Earl Weavers agonize over whether to suicide-squeeze the winning run in the last game of the Series. However, the richness, depth, and complexity of games will change radically as the power of the microcomputer of the future is utilized to make more involving interfaces between the player and game practical and affordable.

The increased storage and speed of our 1999 home computer will make interacting with a game much more natural. The keyboard, joystick, and monitor have been the mainstays of the man/machine interface for the last ten years and were only recently joined by the mouse. As long as one is required to touch a physical object that is obviously not part of the fantasy experience, submersion in a game is fundamentally limited.

The keyboard and mouse may remain in favor with wordsmiths and artisans, but voice will be the interface of choice for many dedicated gamers. The primitive systems of the early eighties, which often had difficulty differentiating between *cat* and *dog*, have given way to sophisticated speaker-independent and "trainable" voice-recognition systems with thousand-word vocabularies. Large corporations are presently installing such systems for use in automated customer-service systems. While expensive by today's standards, the technology will likely be integrated by 1999 into a few on-board VLSI chips.

Imagine exploring foreign worlds and dungeons by voice command—freed from removing attention from the game experience to peck away at a keyboard or push buttons. More complex versions of today's "specialized" input devices will be developed. Simple light pistols and flight yokes will evolve into the complex weapons and control systems required for popular games.

This last holiday season saw the introduction of Nintendo's Power Pad, a crude but effective control interface that requires hyperkinetic kids to stomp and run on numbered, colored circles to stimulate motion within a game. By 1999, gamers will input character movement by donning lightweight gaming clothing that contains an exoskeleton of motion sensors.

Visual Vistas

The color-display monitor may be the last part of the man/machine interface to change. Although games designed expressly for EGA- and VGA-capable systems are becoming more common, the ubiquitous CGA graphics standard continues to be the least common display denominator. CGA's low resolution and boring green/yellow/red and purple/blue/white color combinations will not fade completely from the scene until 1993 or so, when bundled hardware-assisted VGA display adapters and monitors fall below $300.

Large-screen VGA-compatible displays with higher resolution and the ability to mix computer-generated images and standard video signals are already on the way. One of the most exciting areas is the application of high-resolution color heads-up display (HUD) technology to computer gaming.

Heads-up displays have been in use in jet fighter aircraft since the late seventies and have been growing in sophistication at an exponential rate for the last several years. HUD systems project images onto laser-etched surfaces, producing multicolored objects that are superimposed over the viewer's normal field of vision. The Air Force has recently been experimenting with "battle helmets" for pilots that completely enclose the head. The pilot's view of the real world is replaced with a 240-degree array of computerized HUDs overlaid on computer-generated video displays. This completely artificial visual environment isolates the wearer in a tightly controlled experience that presents all that the pilot needs to know to fly and fight.

Think we're talking pie in the sky? The first monochrome heads-up display for personal computers is being readied for production as you read this. Reflection Technology's Private Eye is a four-ounce display device that produces a high-resolution image that literally floats in midair before your face. It's not hard to imagine slipping into a sophisticated gaming helmet that projects a lifelike

video viewscape with which to interact.

Adventure fans will be able to completely submerse themselves in the dungeon experience. Sunday-afternoon armchair pitching artists will check the runners at first out of the corner of their eye and watch for signals from the dugout before delivering the pitch the catcher has called for.

Today's rudimentary 3-D glasses, based on liquid-crystal shutter technology, will be highly refined before they give way to laser-projection systems that allow your computer to create and control 3-D holographic images that you can actually walk around, your view of them changing with your perspective.

Graphic Sound

The processing speed, storage, and display capabilities of the IBM PC and compatibles are able to hold their own against other computer systems, but one area that needs real improvement is sound. The hopeless bleeps and squawks that emanate from the tiny speakers of most PCs pale in comparison to multivoice stereo capabilities of systems such as the Commodore Amiga and Apple IIGS.

While add-in expansion boards are available to augment the PC's sound facilities, they are rather costly and are meagerly supported by software. The next generation of PCs, due in the early 1990s, is rumored to support an inexpensive set of optional sound chips with eight programmable voices capable of multitimbrel sound. Couple that capability with adequate external storage and the aural possibilities are boundless.

Digital quadraphonic sound will heighten the realism of all types of gameplay. Explorers of musty dungeons will hear the dry rattle of skeleton warriors attempting to ambush them from the rear. Chess aficionados will be able to call up context-sensitive lectures from Bobby Fischer or Boris Spassky. Flight simulator pilots will be surrounded by the roar of twin Rolls Royce engines as they are verbally led through dogfight aerobatic lessons by their Top Gun instructors. Combat training for action/adventure games will include training films with full-motion video.

In UNIX We Trust

Unlikely as it may seem to MS-DOS and OS/2 adherents today, the UNIX operating system will become the standard for many home microcomputers as well as corporate mainframes. Could the high cost of game development possibly fuel this transition? Thousands of man years are expended annually on translating popular entertainment titles from one popular microcomputer to another.

Adoption of UNIX as the microcomputer operating system of choice will make translation between different systems a fairly trivial exercise, freeing game designers to spend more of their time on improving the quality and content of their products.

UNIX's support of concurrent multitasking and advances in voice/data transmission over cable television and telephone lines will bring remote multiplayer gaming into its own.

Today, information services such as CompuServe and GEnie offer a limited variety of multiplayer games, but frequent use of them is expensive and often less than engrossing due to limited speed and graphics capabilities. The addition of an under-$200 external interface box to our 1999 PC will allow up to eight players located anywhere in the world to participate in the same interactive visual experience with full voice communication.

HyperSpace

Simulations of interstellar combat and exploration will be made by crews seated in their respective living rooms, each with a tactical display before them appropriate to their function within the game, be it control of engineering, navigation, medical facilities, or battle operations.

Realtime video displays of your face or computer-generated alter egos will be integrated into the fabric of the simulation. Winning a pitched battle will require coordination of action and communication between everyone involved, just as in real life.

The same technology will also change the nature of television's most popular genre—the game show. Local, national, and international knowledge and luck-based game leagues that you participate in for money and prizes (frequently interrupted by commercials made all the more irritating and persuasive by our advances in technology) will become a worldwide obsession.

Universal access to high-speed data networks in 1999 will also change the nature of packaging and distribution of entertainment software. Computer owners will regularly link up to software emporiums where they may interactively view software demonstrations. Unique hardware keys attached to your system will allow trial-size versions of games to be automatically transferred into your home systems for a test drive, and if you like, you may then purchase and acquire the real thing immediately, either for unlimited use or in the form of special versions good for a limited number of plays or amount of time. While most documentation will be embedded within the program itself, any printed materials will be produced with better-than-typeset quality on cheap 1000-dot-per-inch laser printers.

Society at Work

We work and we play. While the 40-hour work week is not likely to vanish, many Americans will use their computers to work

at home. Reducing the amount of time spent on the road commuting means more leisure time, which will further fuel our appetite for computer-based entertainment. More time spent playing highly involving games will likely result in sociological changes within our culture as well. The increased popularity of computerized entertainment will create a widespread horizontal gaming subculture, with its own slang, social rituals, and modes of dress.

The public school system will be replaced by self-paced interactive games that teach basic skills. Designers of popular games will become celebrities in their own right, and their social lives will be the subject of myriad vacuous pop-news items and Robin Leach, Jr., pieces. Their names will be as recognizable to the general public as those of today's popular fashion designers, and new software will be rolled out at nationally televised media events.

Is all this farfetched supposition, or is it gross underestimation of the effect of changes in computer games over the next decade?

Whatever face computer-based gaming wears in 1999, it will reflect the tenor and values of our time.

Games: 2000

Keith Ferrell

We've only just begun. Ten years from now, who knows?

We can have fun, though: We can *entertain* ourselves with some qualified guesses about what lies ahead for PC games. The prudent prophet should bear in mind two classic caveats: First, the future is not only stranger than we imagine, but it's also stranger than we *can* imagine; second, they who use a crystal ball should be prepared to eat cut glass.

Armed with those cautions, let's glance ahead a decade or so and see what kinds of gameplay might be available in our not-too-distant future.

Cutting-Edge Micro

For all the talk and effort directed at standardizing the PC, microcomputers remain the most individual of electronic devices. The home computer a decade from now will likely reflect its owner's distinctive tastes, desires, and attitudes. Home entertainment enthusiasts will be able to tailor their hardware and software to mirror their own natures.

Yet some things will hold true for every electronic household. Levels of play will be deeper than ever before; some forms of entertainment will be all but indistinguishable from reality itself. Likewise, the computer will play "smarter." Advances in artificial intelligence, fast communications, and processor technology will result in home entertainment systems that are responsive and thoughtful and present something like a personality to their owners.

And the machine will look better. The high-definition television revolution will reach computerized homes in advance of mass broadcast acceptance. Video drivers accessing enormous optical storage disks will present players with near–cinema-quality images, adding a degree of realism to even the most trivial diversions.

Sound is another frontier whose boundaries, already being pushed, will by 2000 be stunningly extended. Speech and concert-quality digital voice and music will enhance every field of entertainment.

Interactive entertainment is the field where everything—consumer electronics, computers, television, music, art, history, and speculation—comes together. In the playroom of 2000, all the world's stages are available, in full color and superb sound, in your very own home.

Is It Real, or Is It . . . ?

While quality of image, sound, and gameplay will achieve high levels that will be similar from household to household, it's in the other details of entertainment that our individuality will shine through. Playful peripherals of every type and nature will be available—for a price.

As computers reach larger and larger numbers of homes, the markets for custom hardware and software entertainment add-ons and services will grow. Flight simulator enthusiasts, for example, will be able to seat themselves at cockpit-like consoles; for that matter, you can already buy rudimentary flying yokes for your PC. Tomorrow's instrumentation will be available onscreen or via digital readouts on the console. A headset will deliver full voice communication from air traffic control; the pilot's microphone will let him or her speak to a computerized ATC (Air Traffic Controller) that will understand and respond.

Vast libraries of simulated flights will be accessible either from disk or online. Serious pilots will download current weather conditions before starting their craft's engines. Realtime fliers will receive constant weather updates from online simulation services. Combat aces will put their planes through the paces of real battles, with "real" consequences. Imagine flying as Dick Bong's or Eddie Rickenbacker's wingman—or having them on your wing.

At the very highest end, hot PC pilots might invest in hydraulic flight chairs, which would shift position and angle in response to flight controls.

Specialty peripherals will appear for all manner of entertainment. Golfers will be able to play any hole in the world, in any weather or course conditions. Rather than wiggling a joystick, computer golfers can anticipate using some sort of actual club, with swing and follow-through monitored by computer and reflected on the screen. Digitized commentary will let any beginner experience the feel of televised championship play.

As computers reach a large enough number of homes, no pastime will be too specialized to receive the attention of luxury peripherals manufacturers. Armchair sailors might invest in tillers and lines linked to servos that offer resistance similar to that felt at the helm of an actual sailboat. "Star Trek" fans—whose number seems unlikely ever to dwindle—ought to be able to purchase mockups of Captain Kirk's center seat on the Enterprise.

War Room

A war gamer's entertainment center might more closely resemble a combat command center. Multiple screens will offer glimpses of battle from various perspectives. Topographical and strategic maps will be available. More than ever, all the aspects of war will impinge upon a game: Fuel, food, and morale will become all but real considerations in the latest editions of war-gaming software.

Again, it is details that enhance the illusion of reality. A player involved in a World War II simulation, for example, might opt to receive reports from the front by way of digitized voice and telephone or radio. A Napoleonic gamer, on the other hand, might choose to have his or her intelligence reports delivered by messenger—with a laser printer serving up facsimiles of field commanders' communiqués. There's also an educational opportunity: A Napoleonic gamer might elect to have communiqués delivered in vernacular French.

More sedate gamers will have exciting options, too. A bridge enthusiast might invest in an interactive card table/scanner equipped and able to read actual playing cards. Such a table would ensure that you were never without a fourth—or even a second or third.

High-quality color laser printers will bring home new pastimes. Jigsaw-puzzle enthusiasts will be able to generate their own challenges, upload them to services for reproduction and cutting, and receive the new, personal puzzle in the mail.

Educational games will assume a new depth with the evolution of hypertext tools and vast databases. Trivial Pursuit will take on a whole new dimension—and not a trivial one—when questions are generated by a computer with access to, say, the files of *National Geographic, American Heritage,* and the *New York Times.* Intellectual scavenger hunts will find a huge market of would-be scholars eager to test their research skills as they prowl through vast bodies of knowledge.

Zapping Aliens

On a more physical level, we'll see a new depth to arcade-style entertainment. The appeal of the arcade game has always been fast action, vibrant colors, and super sound, and that appeal will only grow as technology matures. The way we play our arcade games, however, will undoubtedly change as joysticks are superseded by more sophisticated input devices.

Imagine an arcade suit, for example—a garment with sensors woven into its fabric. Don the suit before booting the game, and your entire body becomes an instrument of play. One can envision a generation of teenagers twitching and turning their way through a St. Vitus's dance of arcade entertainment. Such suits will likely appear first in rental arcades, where you play for a fee.

On a smaller and perhaps more likely scale, *smart* gloves will reach the home consumer before the turn of the century. The gloves will create the illusion of manipulation, letting computer owners "touch" the items encountered on their screens.

Whatever the input device, the colors and sound that accompany arcade excitement are likely to grow in quality. High-definition television, 3-D imaging, infinite palettes of colors, and quadraphonic sound are among the barrage of new technologies arriving to lift computer-based entertainment to heights never before considered.

Master the World

Not every game need offer escape. Advances in software modeling will find a large audience eager to have its say exerting control over lifelike images of the real world.

Suppose you could sit at your console and assume the position of a global leader. Thanks to communications and databases, you'd have at your disposal all the information and resources upon which such a leader could draw. Artificially intelligent advisers would be available to counsel and comment upon your decisions.

Such simulations have already been produced, of course, the most notable example being Chris Crawford's *Balance of Power.* The next generation of such games, however, will offer players far closer approximations of reality—far more detailed representations of the real world's political, economic, and cultural environments.

One can foresee games in which you pit your daily decisions against those being made by actual world leaders. The morning news would become not only an important

vehicle for receiving information, but also a yardstick against which your gaming prowess was measured.

Reality games will become a sort of testing ground, a forum in which various ideas and strategies might be tested against real-world constraints. For many of us, these alternative worlds may become more attractive than the real thing.

Hear, Hear

As computers become more and more able to handle sound and equally able to store large volumes of digitized audio, we'll experience the return of verbal storytelling. Novels and stories on tape are already enormously popular. Couple that popularity with evolving computer technology, and some exciting possibilities emerge.

Suppose you could sit back in your favorite easy chair and boot up an audio rendition of *Oliver Twist*. As you listened to the story, your screen would scroll through images of nineteenth-century London, lithographs and paintings that would not necessarily represent actual scenes from the book, but would serve to enhance your enjoyment of the story you were being told.

On a more abstract level, perhaps we'll see a marriage of biofeedback, fractal- or random-image generation, and storytelling. You might wish to have your screen respond to the emotions generated by the story to which you're listening. A simple headset will monitor your reactions, translating them into signals that will splash patterns of color across the screen.

Story Time

Interactive narrative entertainment will evolve as well. The art of storytelling is, I think, the next great frontier for interactive entertainment. By the turn of the millennium, that frontier will have been pushed backed substantially.

Today's storytelling software—interactive adventures, text games, and role-playing software—continues to rest upon a bed of puzzles and word games. The challenge is not so much to reach the end of the story as it is to type the right word or make the proper decision.

By 2000, we'll have achieved something close to fiction via computer. Advances in mass storage will permit the creation of huge software environments, while advances in artificial intelligence will make navigating our way through those worlds much easier.

The role-playing game will become an even more attractive—or obsessive—pastime than it is currently, and this will occur because we'll more than ever before be able to put ourselves in the midst of the adventure.

Software tools will be tailored to these ends. You might spend the occasional hour building a database portrait of yourself, your tastes and interests, your responses to various situations and circumstances. Gradually, an analog of yourself will come to life in the computer. Rehearsing your disk-based golem in various scenarios will ensure as accurate a facsimile of your nature as possible.

Naturally, this sort of artificial *other* need not slavishly reflect yourself. You might wish to create a twin who's more muscular, or taller, or who has faster reflexes than your own. While advances in digitization of images as well as animation software will make possible a recreation of your appearance onscreen, many of us will opt for stylized graphic rather than photographic characters.

Whatever its visual nature, when your electronic self is ready, you'll be able to share it with other gamers. You'll launch your character into one of the many online worlds where adventure awaits. Or send your character to a friend to participate in a game on his or her machine. Such a capability obviously offers dramatic possibilities for interactive play, but a new form of spectator entertainment may arise as well. Once your character has been created, you might insert it into the script of a computer-generated movie, novel, or audio play and sit back and watch, read, or listen to a story in which your alter ego is centerstage.

Brave New World

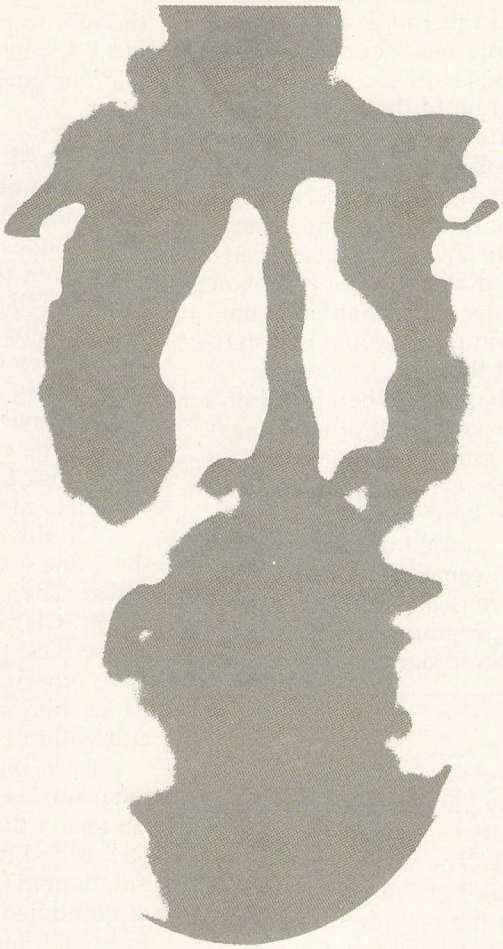
These advances in interactive entertainment will carry with them certain issues and questions. If the present generation of arcade games, for example, is criticized for excessive violence, imagine the debate that will arise over TV-quality arcade images, Technicolor shootouts, war games that graphically represent the horrors of combat.

Role-playing games have been controversial since the earliest days of Dungeons and Dragons, and it's not likely that the controversy will recede as the games become more compelling. When is a game or alternate reality *too* hypnotic? Can computer entertainment be more seductive than reality? Pornography, which has been with us since ancient times, will likewise carry additional baggage as interactive software grows into the next century. How dangerous will it be for individuals to enact their deepest, darkest fantasies via the computer?

These are questions whose shape is only just beginning to emerge. Wrestling with them will take years, and the debate is likely to become heated.

Even as such debates proceed, though, computer entertainment will continue to evolve and grow, ushering in a new era of personalized pastimes in which our every dream will have the illusion of becoming real.

In a decade, the electronic wings for our imagination will let us fly very far indeed. **PC**



MAN VS. VIRUS
A Personal Story

Although your chances of encountering a computer virus are one in a million, viruses do exist, and running headfirst into one can be a traumatic experience. This true story offers a blow-by-blow account of just what happened when a veteran computer user stepped into the ring with a malevolent virus.

Robert Long

It was the first working day after Christmas. As a cottage computerist, I couldn't get much work done because we had house guests, but I was eager to look at a package of shareware programs that had arrived in the day's mail. It was from a company I had never dealt with before, but the ad included a number of intriguing programs, so I had ordered a dozen disks.

I make it a rule to put write-protect tabs on my originals, copy them to working disks, print the documentation, and only then consider running the program or putting it on my hard disk.

I didn't want to appear to snub our guests, however, so I just took a quick look at the originals of my new goodies, beginning with the serious stuff.

When I moved on to the games, I loaded the CGA emulator for my Hercules card. The first game I looked at was pretty dumb. The next one featured a rather mechanical-looking face leering at me from the screen and a voice from the PC's loudspeaker addressing me as "humanoid." The eerie voice said something to the effect that I was the worst enemy my computer would ever have. How sophomoric, I thought, waiting for something else to happen. When it didn't, I went on and tried a couple of other things, none of which did much to enhance my opinion of shareware games as the route to a pleasantly misspent hour or two.

After a while, I retried the first game. The opening screen came on, but now it contained an error message indicating some sort of fault in the program. It had worked before. I reloaded the program several times, always with the same result. "Forget it," I thought to myself, "it's not worth the effort." I shut down the computer and went to join our guests.

Morning After

It was the next day before I began to wonder about that face and the message. In retrospect, I question whether I might have come away from this misadventure unscathed if I'd immediately thrown out all the disks that had been in the computer since that ominous message emerged. But I couldn't believe that I had really sat eyeball-to-eyeball with something as evil as a computer virus. After I'd booted the computer, I displayed a directory of the disk from which the face had materialized.

On the disk was what appeared to be the game's .COM file, dated several months earlier. There were also files named CHROMA .COM, CHROMA.TXT, and CHROMA.PIC. These files, plus several others that I might have otherwise assumed to be part of the game, were all time-stamped more recently, and within a few minutes of each other.

Even then, I couldn't entirely believe what was as plain as the nose on that ghoulish face. I don't remember precisely what tack I tried next, but presently I heard the "humanoid" message once again. Emanating disembodied from a blank screen, it seemed truly ominous. It was like the witch who gave the apple to Snow White and cackled off into the mist.

Finally it dawned on me that I had better immediately remove any disks that might be infected and clear the contents of memory by cold-booting the computer. When I tried, the computer wouldn't boot from the hard disk. I tried the plain-vanilla boot disk (no unnecessary drivers or resident utilities) that I use during backup, which worked.

In my search to find out why I couldn't boot from the hard disk, I typed CONFIG .SYS to the screen. Right in the middle, there was what looked like an extra linefeed: a blank line that I knew I hadn't put there.

Bump in the Night

Over the next two days, as I delved deeper, this pattern recurred many times. ASCII files used in the booting process would suddenly develop that extra blank line. I have no doubt that these lines were inserted by the virus.

My hard disk is a FlashCard-30, sold by CompuAdd. With the help of its technical support and a knowledgeable friend, I used DEBUG and FDISK on my original DOS disks to completely reformat my hard disk, destroying everything on it. Once I did that, I was told, it should be clear sailing as long as I didn't use any of the floppies that had become infected.

Fight Back

Having a virus infect my computer system was a devastating experience, but it has strengthened my resolve. The virus may have won the first round, but I'm going to win the next. Sitting on the far side of a virus infection, here's my advice to fellow PC users:

- Purchase software, both shareware and commercial products, from known, reputable sources only.
- Make several working copies of your original DOS disks.
- Never loan programs to others unless you're sure the programs are virus-free.
- Be wary of using friends' programs.
- Never put an unfamiliar disk in your drive unless you're certain about where it has been.
- Protect your system by using an antiviral program regularly. [*Rich Levin's Checkup*, found on this issue's disk, is a good choice—Editor.]
- Be selective about who you let use your computer.
- Never boot from a floppy disk unless it's your original DOS disk or one you've personally prepared.
- Make frequent backups of your hard disk.
- Read *Computer Viruses*, by Ralph Roberts (COMPUTE! Books, 800-345-1214; $14.95 plus shipping and handling).

Since the next step, after reformatting my FlashCard-30, was to restore the hard disk from my backups, I needed to boot from my floppy drive. I may have rebooted with my plain-vanilla floppy, though I think I used my original DOS disk. Or I may have warm-booted instead of completely turning off the computer following the reformat. So I'm not sure whether the virus survived in memory, on the plain-vanilla disk, or by writing to a write-protected floppy. In any event, I soon found that the malevolent spirit was anything but exorcised.

Bad Penny

I won't bore you with the complex pattern of failures that followed my reformatting, but at first, they didn't appear to be virus-related. The face and voice were gone, but other problems appeared.

All internal DOS functions seemed to operate normally, but when I invoked *Q-Filer* (my favorite hard-disk maintenance utility) to copy some files, I found I had insufficient memory to load the program. It seemed the virus was creating a tapeworm whenever I booted, filling memory and preventing me from loading anything but DOS itself. If I couldn't load DEBUG, I couldn't even redo the low-level reformat.

That's when panic set in. I used a tape degausser to erase every floppy disk—including my original DOS disks—that might have been in the computer since that leering face appeared. (For that reason, some of the specifics are hard to reconstruct.) I disabled the clock/calendar battery in my FastCard IV EMS expansion card to prevent the date memory from harboring any code. I removed the FlashCard-30 and sent it to CompuAdd for sanitization. And I dug out my old CP/M computer so that I could go on working.

Unfortunately, my adventure isn't over yet. My immediate plan is to buy a new copy of MS-DOS and make multiple working copies of the disks. Then I'm going to install my programs on the clean, reformatted hard disk from the original distribution disks, not from my backups.

For a while, I'll probably have some anxiety every time I fire up the machine; there's a sense of being defiled by an episode like this that you can never quite forget. If I do encounter problems in the future, however, I'm determined not to let the creeps who write viruses get the better of me. Next time things will be different.

Bob Long has been associated with High Fidelity *magazine for over 20 years as a writer, reviewer, record librarian, and photographer. He's been working with personal computers for five years.* **PC**

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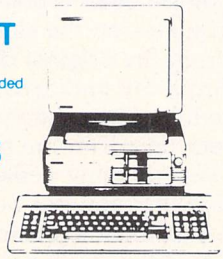

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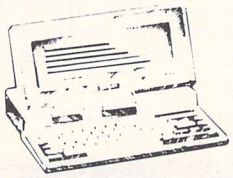

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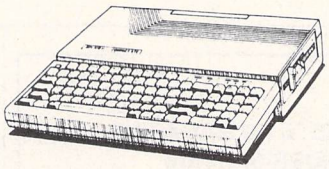

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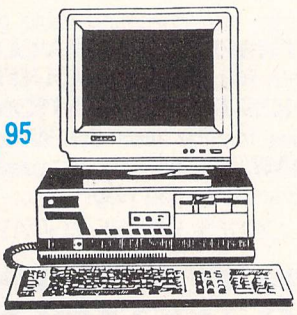

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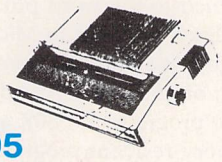

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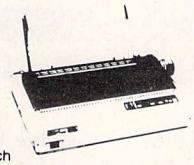

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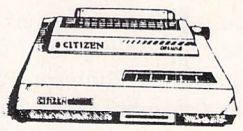

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Paragon Marvels at Comics

Computer software developer and publisher Paragon Software has signed an exclusive agreement with Marvel Comics to create a series of games featuring the heroes and villains of Marvel Comics.

Paragon's first release will be an interactive comic/arcade adventure titled *Spider-Man and Captain America in Dr. Doom's Revenge.* The plot, outlined in an actual comic book included with the package, involves Dr. Doom and his plan to steal a nuclear missile and launch it toward New York City. The U.S. government calls upon Spider-Man and Captain America to thwart Doom's plan. Doom has enlisted the help of several Marvel Comics supervillains to do battle with the superheroes.

The computer game picks up where the comic book leaves off, with additional comic panels appearing on the computer monitor. Players interact with the story through their computer, determining the future of New York.

Paragon scheduled a March release for the IBM PC and compatibles version of *Spider-Man and Captain America in Dr. Doom's Revenge.* A suggested retail price was not available at press time.

The software company also announced that it has signed an exclusive marketing and distribution joint venture with MicroProse Software. Paragon becomes a member of the Medalist Software Group, which will eventually include six noncompeting affiliate-label companies.

Paragon Software, 600 Rugh St., Suite A, Greensburg, PA 15601

Circle Reader Service Number 200.

My Hometown

If you've ever wanted to build your own town, now it's possible (on a smaller scale) with Publishing International's *Hometown U.S.A.* The program provides a series of model-building plans for a typical small town in America.

Users can make the buildings as simple or as complex as they like, which allows for a wide variety of building designs. The buildings can be used as Christmas decorations, as accessories for a train set, or as gift boxes.

The program is designed for use by both children and adults.

Hometown U.S.A. is available for the IBM PC and compatibles. The suggested retail price is $39.95.

Publishing International, 333 W. El Camino Real, Suite 222, Sunnyvale, CA 94087

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Commodore AT

Commodore Business Machines has introduced the PC40-III, the latest addition to its Professional Series III line of MS-DOS computers.

Commodore's PC40-III enters the AT market.

The AT compatible features a 12-MHz 80286 microprocessor with 1MB of RAM, 256K of video display RAM, and IBM VGA–compatible video and graphics modes. Storage includes a 1.2MB 5¼-inch floppy disk drive, a 19-millisecond 40MB high-performance hard disk drive, and an optional 3½-inch floppy disk drive.

The 286-based machine includes four full-length expansion slots (three AT slots and one XT slot), internal space and power to add a second 3½- or 5¼-inch floppy disk drive, and an AUTOCONFIG BIOS that automatically recognizes most installed add-ons.

The unit includes built-in parallel, serial, and mouse ports; a clock/calendar with battery backup; and a 101-key keyboard with a numeric keypad and a security lock for keypad lockout.

The PC40-III is available through authorized Commodore Professional Series III dealers and has a suggested retail price of $2,395.00 without a monitor and $2,595.00 with the Commodore Model 1403 monochrome VGA monitor.

Commodore Business Machines, 1200 Wilson Dr., West Chester, PA 19380

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Foreign Language Assistance

MicroTac has released a series of programs designed to assist language students, business professionals, teachers, and anyone else who works with foreign languages. The Language Assistant series acts as the user's personal study partner.

Each Assistant—Spanish, French, or Italian—acts as a reference guide with verbs conjugated in all 14 tenses and examples. If the users don't know the verb in the language they're studying, they just type in the English equivalent. Difficult grammar topics are explained and clarified with examples.

Users can operate each Assistant either as a memory-resident or stand-alone program. It also works with word processors, popping up on command. After you answer the question, you're returned to the word processor.

Each program in MicroTac's Language Assistant series requires a minimum of 256K when used as a stand-alone program and 80K when used as a memory-resident program.

The programs sell for $39.95 each, $69.95 for any two, and $99.95 for all three.

MicroTac, 525 Hawthorn St., Suite 11, San Diego, CA 92101

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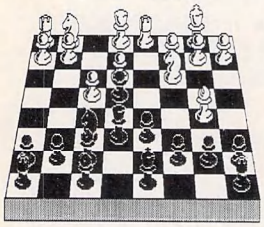

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SIM-CGA (1027) Run programs requiring CGA on your Hercules or compatible monochrome monitor.
GRASP (1031-1032) (2 disks) Create and run graphics demo programs. Uses any graphics card. Req. CGA.
LIGHTNING PRESS (2718) Printshop clone. Library of graphics for cards, letterheads, posters, newsletters, etc. Req. CGA.
CITY DESK (2513) Simple and easy to use desktop publisher.
EGA TROPICAL FISH (1087) Turn monitor into a fish tank. CGA also.

PRINTER UTILITIES

DOT MATRIX FONTS (3061-3062) (2 disks) Print out text in different fonts. Programs for IBM Proprinter, the Epson 800/1000 series, Star NX10 and NEC printers.
LASERJET FONTS/II (2721-2722) (2 disk set) Downloadable fonts for the Laserjet Plus II.
LQ V2.1 (2724) Produces high quality text on dot matrix printers.
LINCOMATIC BANNER (2714) Make banners with different fonts & sizes.

DESKTOP ACCESSORIES

HOMEBASE V2.0 (2608, 2612, 2613) (3 disks) Outshines Sidekick. PC-Magazine Editor's Choice. Many features.
PRO-MENU (3033) Run DOS and other programs from menus. Automatic custom menu maker. Make it easy on yourself.
INSTACAL (2610) Print wall-size calendar for any month or year between 1600-2200 A.D.

DATABASE

FILE EXPRESS (803-804) (2 disks) Menu-driven, easy to use and powerful. Rated excellent by PC Magazine.
PC-FILE+ V2.0 (801, 805, 837) (3 disks) Excellent. Full-featured with help screens. by Jim Button.

SPREADSHEETS

PC-CALC+ V1.0 (512-514) (3 disks) The Complete Spreadsheet program. By Jim Button.
EZ-SPREADSHEET (509) Simple and easy to use. Great for novice.
QUBECALC (508) Unique and powerful 3-D spreadsheet.
LOTUS MACROS (601) Saves much time and effort. Requires Lotus.
LOTUS TEMPLATES (602) Ready to run. Requires Lotus.
LOTUS TUTORIAL (630) Excellent. Beginning and advanced.

BUSINESS

EZ-FORMS (1908) Menu-driven forms generator.
EZ-FORMS EXEC V2.0 (2015) Contains additional features to 1908.
EASY PROJECT V1.2 (BS27) Complete project management system.
PC-GENERAL LEDGER (701) Menu-driven accounting system. Easy.
PERSONAL FINANCE MANAGER (715) Household budget manager. Keeps track of checking, savings, and investments.
MR. BILL (702-703) (2 disks) Bill customers. Create invoices, client reports, audit trail, etc.
BIDS 'N QUOTES V0.9 (BS26) Prepares cost estimates, proposals. Does labor, material, sub-contractor costs, etc.
DOCKETMINDER V1.2 (BS25) Maintain docket for lawyer or law firm.
RENTAL PROPERTY (BS24) Keeps track of rental activity. Menu driven.
BUSINESS LETTERS (BS22—BS23) (2 disks) 650 business letters to cover all your needs. Edit with any word processor.
SBAS V1.3 (797) Small business accounting system. Menu-driven.
PRO PC-ACCT V3.0 (BS28) Integrated G/L, A/R & A/P. Menu-driven, pull-down help.
SOAR V1.92 (BS20-BS21) (2 disks) Accounts receivable program. Handles variety of services or products.
CK - CHECKBOOK V3.14 (755) Full featured checkbook with reports.
PC-PAYROLL (714) Menu-driven payroll system.

EDUCATION

FUNNELS & BUCKETS (201) Great learning game. Add, subtract, multiply & divide. Ages 5-10.
LETTERFALL V1.1 (282) Improve your typing skills. Many levels.
BEGINNING SPANISH (211) Learn basic Spanish.
SPANISH II (232) Sequel.
MATHPAK (202) Tutorial with lessons in higher mathematics.
EDUCATIONAL PROGRAMS (207) For pre-school and elementary.
ERYN'S ABC'S (270) Teaches alphabet & numbers. Computerized Etch-a-Sketch. Ages 2-6. Requires Basic.
AMY'S FIRST PRIMER (248) Teaches alphabet, numbers, counting, shapes, matching, etc. Ages 4-8. Requires CGA & Basic.
THE WORLD 3D (235) Displays maps of the world. Requires CGA.

SAN MATEO EDUCATION (283) Teaches math, chemistry & geography. Ages 8-16. Requires CGA.
SPELLING BEE (284) Grades 1-12. Requires CGA & Basic.

MUSIC

PC-MUSICIAN (302) Compose music. Save and play it back.
PIANOMAN (301) Turn your keyboard into a piano!
CHRISTMAS SONGS (311) Includes many of your favorites.

COMMUNICATIONS

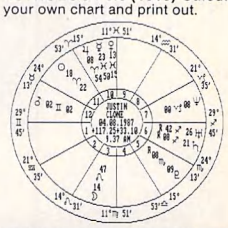
RBBS BULLETIN BOARD (1107-1109) (3 disks) Turn computer into a BBS. Industry standard.
Q-MODEM V3.1 (1101, 1102, 1143) (3 disks) Full featured modem program. Redialing.
PROCOMM V2.42 (1112-1113) (2 disks) Menu-driven modem program. Considered better than most commercial programs.

SECURITY/HACKING

COPY PROTECTION I (1219) Instructions for unprotecting Brownbag, dBaseIII, PCdraw, Printshop and many more.
COPY PROTECTION II (1220) Unprotect Report Writer, Clout, Castle Wolenstein, Dollars & Sense, Grafwriter and more.
COPY PROTECTION III (1221) Still more. Javelin, Sidekick, Spitfire, Symphony, Thinktank, and more.
VACCINE (1223) Various programs to protect against Virus & Trojan Horse schemes

MISC. APPLICATIONS

BIORHYTHM (1990) Calculate and print your own monthly chart.
DR. DATA LABEL (2327) Professional mailing list program. Print on postcards, envelopes, and any size label.
FAMILY HISTORY (2203-2204) (2 disk set) Creates files and genealogical reports.
STRESS & SHRINK (2006) Includes a stress test and a personality test.
LOTTO MASTER (1981) Play the lotteries with a scientific approach.
MEMBERSHIP SYSTEM (1984) Good for clubs, churches, etc.
HORSES (1999) Handicap system for thoroughbred racing.
HEALTH RISK (2010) Diagnose your ailments.
ASTROLOGY 9.5 (1916) Calculate your own chart and print out.



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Players make decisions that affect their imaginary family's survival as they cross rivers, fend off grizzly bears, ration supplies, and repair covered wagons. In addition to being an adventure game, the program is designed to sharpen problem-solving skills.

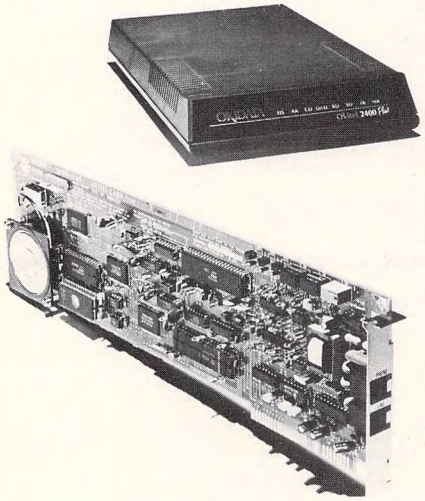
Players can save and continue up to nine games. The program requires a minimum of 256K of memory and a Color/Graphics Adapter (CGA). You can also use your joystick during the game's hunting and river-rafting segments. The suggested retail price of *The Oregon Trail* is $29.95 for the version on 5¼-inch disk and $34.95 for the 3½-inch disk version.

MECC, 3490 Lexington Ave. N, St. Paul, MN 55126-8097

Circle Reader Service Number 204.

Okidata Goes Online

Okidata has introduced two new 2400-baud modems. The Okitel 2400 Plus (external) and 2400B Plus (internal) are fully Hayes-compatible and operate in full or simulated half-duplex mode over public or dedicated lines.



New 2400-baud modems from Okidata.

The modems feature Microcom Networking Protocol class 5 for error correction and data compression. This provides complete error correction along with 2:1 data compression, allowing throughput of up to 4800 bps. Other features include automatic dialing and answering capabilities and memory storage for up to four telephone numbers. A call-progress detection feature enables the modems to detect line activity generated at the telephone company's central office and feed this information back to the software for user presentation. The modems also automatically determine and compensate for the transmission speed of incoming calls.

Both modems work with either tone or rotary-dial telephones and store the last number dialed for automatic redialing. A built-in speaker monitors the calling process and alerts the user to wrong numbers, recordings, and busy signals.

Two standard modular telephone jacks are provided with each modem.

The internal Okitel 2400B Plus is a full-card modem for use in IBM PCs, compatibles, and IBM PS/2 Models 25 and 30. The new modems are bundled with Okitel II communications software.

The Okitel 2400 Plus retails for $549.00, while the 2400B Plus sells for $499.00.

Okidata, 532 Fellowship Rd., Mount Laurel, NJ 08054

Circle Reader Service Number 205.

Lose to Win

Manhattan Software has introduced a computer poker game with a twist. *Seven Card Low (Razz)*, the eighth release in Manhattan's Cards & Gambling series, is a complete turnabout of seven-card stud: Here the lowest hand wins.

Players compete against five computer opponents who play with varying styles and skills. A player who loses his initial stake is out of the game. Higher antes and bet levels raise the stakes as the game goes on, until the last hand leaves one survivor.

The program package includes a manual that describes the rules and procedures of *Razz* and gives some betting tips. Players can save a game in progress and continue it later as well as switch back and forth between *Razz* and Manhattan's *Seven Card Stud.*

The game can run in color or monochrome with a graphics card. The suggested retail price is $35.00.

Manhattan Software, P.O. Box 148, Peterborough, NH 03458

Circle Reader Service Number 206.

That's the Ticket

Blue Lion Software has introduced school editions for its line of educational software products, including its Ticket to . . . series. The programs in the series take students on journeys while teaching the history, geography, language, and culture of each destination.

The titles include *Ticket to Spain; Ticket to Paris; Ticket to Washington, D.C.; Ticket to London; Ticket to Hollywood;* and *R.S.V.P.*, an educational program that teaches domestic and international protocol.

Teacher's editions are available with a teacher's guide and backup disk for $49.95. The teacher's edition for *Ticket to Washington, D.C.* sells for $54.95. Lab Packs with five disks, five manuals, and a teacher's guide retail for $104.95. Super Lab Packs, which feature ten disks, ten manuals, a teacher's guide, and a classroom activity guide, sell for $169.95.

Blue Lion has also released Foreign Language Library and Foreign Language Lab Packs for *Ticket to Paris* and *Ticket to Spain.* The Library has a suggested retail price of $89.95 and contains a teacher's guide and backup disk. The Lab Packs sell for $189.95 and include a teacher's guide, five disks, and five manuals.

The Social Studies Library, which includes teacher's editions of all six products, has a suggested retail price of $249.95. Classroom Activity Guides, which contain lesson plans, projects, reproducible worksheets, and in-class activities, are available for $19.95 each.

Each Blue Lion Software product requires a minimum of 128K and a CGA, EGA, or Hercules graphics card.

Blue Lion Software, 90 Sherman St., Cambridge, MA 02140

Circle Reader Service Number 207.

Change the Course of History

Paragon Software has released a new interactive text/graphics adventure that takes players back in time in order to change the events on November 22, 1963. *Guardians of Infinity* puts players in the role of Adam Cooper, a temporal physicist in the twenty-first century who faces a time continuum that is unraveling by the hour. Cooper has traced the cause of the crisis to the assassination of John F. Kennedy. The physicist, four colleagues, and his 19-year-old daughter travel back in time to stop the Kennedy assassination and reverse the decay of the time continuum.

The text adventure also features a graphics disk that shows the events leading up to the mission. Players can interact between Cooper and his colleagues and arrange strategic meetings between them and some of the best-known figures of the Kennedy era, including Jacqueline Kennedy, Vice President Lyndon B. Johnson, Presidential Press Secretary Pierre Salinger, and the President's assassin, Lee Harvey

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BUSINESS

❒ **EZ-FORMS Rev. D15** (66) - Menu-driven forms generator, misc. skeleton forms.
❒ **FAST BUCKS V3.18-C** (864 & 865) - Menu- driven home finance package.
❒ **EXPRESS CHECK V2.14** (561) - Menu-driven home checking account system.
❒ **COMPETITIVE SALARY ASSESSOR** [737] - Provides "consensus" salary medians & Assessor adjusted estimates of base salaries for over 2,500 positions as compiled from various surveys.
❒ **LEGAL FORMS / LETTERS** (611) - 100 types of legal forms & letters.
❒ **BUSINESS LETTERS** (303 & 304) - (2 disk set) 650 business letters to fit all your needs. Edit w/ any word processor.
❒ **EXPRESSGRAPH V1.04** (457) - Business graphing in 10 different formats.
❒ **GEOGRAPHIC ASSESSOR** [735] - Calculates salary & cost of living differences between over 3,000 U.S. & Canadian cities.
❒ **RENTAL MRG V2.03** (585) - Menu - driven, does credits, debits, reports, handles up to 9604 rental units.
❒ **MANAGEMENT TOOLS** (643) - 10 programs for managers / supervisors. A mini-management course! Great!
❒ **PAINLESS ACCOUNTING VC2.50** [774-776) - (3 disk set) A fully integrated menu-driven accounting package.
❒ **INSTACALC V2.50** (697) - A full power memory resident spreadsheet.

COMMUNICATIONS

❒ **RBBS BULLETIN BOARD V17.1A** (613 - 616) - (4 disk set) Turn your computer into a RBBS.Industry standard.
❒ **QMODEM V3.1** (293 & 294) - (2 disk set) Full featured modem program.
❒ **PROCOMM V2.42** (53 & 54) - (2 disk set) Menu - driven modem program; still one of the best.

DATABASE

❒ **FILE EXPRESS V4.22** (33 & 34) - (2 disk set) Menu - driven database; report generator, many features. One of the best database programs on the market!
❒ **PC-FILE + V2.0** (493 - 495)- (3 disk set) Full-featured database; help screens, menus, macros. Excellent! Buttonware.
❒ **WAMPUM V3.2B** (37 & 38) - (2 disk set) Menu-driven dBase III clone. Knowledge of dBase suggested.
❒ **INSTANT RECALL V1.64F** (515) - Memory-resident free-form database with its own word processor.

EDUCATION

❒ **PIANOMAN V4.00** (4 & 5) - (2 disk set) - Turn your PC into a piano, create & edit music. CGA or mono.
❒ **GRADE GUIDE V3.00b** (118) - A versatile program for storing, retrieving, & analyzing students grades.
❒ **THE WORLD V2.9 & WEADATA V2.0** (127) - Display maps of the world. CGA, EGA required.
❒ **FUNNELS & BUCKETS V2.0** (130) - Great learning game; add, subtract, etc. Ages 5-10. CGA / monochrome.
❒ **AMY'S FIRST PRIMER** (133)- Alphabet, numbers, counting, shapes, matching, etc. Ages 4 - 8. CGA & Basic required.
❒ **ANIMAL MATH/MOSAIC** (181) - Count objects & graphic learning tool. Ages 4 & up. CGA required.
❒ **MATH HELPER** (188) - Teaches various math operations. Ages 5 and up. You choose the level. Basic required.

GAMES

❒ **BLACKJACK GAMES V1.1** (95) - 3 advanced blackjack games, multiple players / setup. CGA or Hercules.
❒ **GAMES OF SKILL** (100) - Contains pool, bowling, & backgammon. CGA required.
❒ **MONOPOLY V6.7** (106) - Just like the board game, 2 to 4 players. CGA req.
❒ **LAS VEGAS** (116) - Craps, Roullete, Poker, & more. CGA req., Basic on some.
❒ **SOLITAIRE** (211) - 4 different games. Nice graphics. CGA required.
❒ **PLAY 'N LEARN V2.01** (624) - Contains 7 games designed for kids up to 6 years old. CGA required.
❒ **SUPER PINBALL** (212) - 5 different games. CGA required.
❒ **3-D CHESS V1.01** (215) - Excellent chess game. Switch between 2-D & 3-D. CGA or monochrome required.
❒ **WORDPLAY V1.01** (367) - Wheel of Fortune clone. You provide prizes. CGA required.
❒ **MINIATURE GOLF** (505) - 18 hole golf course with graphics. CGA required.

GRAPHICS

❒ **FINGERPAINT V2.00** (282) Great paint program, easy to use. CGA, EGA, or monochrome.
❒ **PRINTMASTER GRAPHICS** (319, 549 & 550) - (3 disk set) Over 440 misc. graphics for Printmaster/Plus. Requires Printmaster or Plus. **For Printshop Graphics- Order disks** # 320, 589, 590 respectively.
❒ **PC DRAFT II V3.20** (629) - A painting/drafting program most useful for producing clip-art for desktop publishing applications. CGA required.
❒ **DANCAD 3-D V2.0E** (424 & 425) - (2 disk set) Advanced 2-D/3-D drafting program. Stereoscopic 3-D wire frame animation. Hard drive & 512k req.
❒ **PC-KEY-DRAW V3.51** (748-751) - (4 disk set) Combines features of a CAD & paint program for power/flexibility. Includes a full graphical database called HYPERDRAW. **NEW...**

LANGUAGE

❒ **TURBO "C" TUTOR V1.50** (489 & 490) - (2 disk set) 14 lesson tutorial learn to program in 'C' language. Works with Borland's Turbo C
❒ **"C" LANGUAGE V2.1** (299 & 300) - (2 disk set) Complete programming environment. Source, compiler, samples.
❒ **ADA TUTOR** (644) - An interactive tutorial for the ADA programming language.

NOVELTY

❒ **YOUR PERSONAL POET** (718) - Create your own poem from a variety of choices & print it. **NEW...**
❒ **HUMOROUS DOS TRICKS** (236) - Various tricks to play on your friends. A must for any joker...
❒ **CROSSWORD CREATOR V3.30** (422) - Design, solve & print professional looking puzzles. **NEW..**
❒ **PC-BARTENDER V2.00** (619) - Recipes for approx. 200 drinks. Search by drink, ingredients, adjust sizes, etc.
❒ **WEIGHT CONTROL** (586) - Get rid of those unwanted inches / lbs.

PRINTER UTILITIES

❒ **LQ V2.32** (509) - Produces high quality text on dot matrix printers. Multiple fonts with print spooler. **NEW...**
❒ **LASERJET FONTS/2** (471 & 472) - (2 disk set) Fonts include: Pica, Old English, Script, & Garamond.
❒ **LASERJET UTILS/2** [328) - Places 2 pages side by side, convert fonts for Ventura, make graph paper, & more.
❒ **ON-SIDE V1.01** (560) - A sideways printing program with multiple fonts, up to 175. Great !!!

SPREADSHEET

❒ **LOTUS LEARNING SYSTEM V2.4** (769 & 770) - Explanations, illustrations, & practice sessions. Tutor Does NOT require Lotus.
❒ **QUBECALC V3.02** (591) - A 3-D spreadsheet program, turn rows into columns, import Lotus files, 44 predefined functions, & more.
❒ **AS EASY AS V3.01F** (302) - Lotus clone. 52 column sheet, graphing, supports functions of 123, 'WKS' files, etc. **NEW...**

UTILITIES

❒ **SIM-CGA V4.0** (220) - Great for most programs that need color (CGA) to run.
❒ **DOS HELP V3.3** (255) - Help screen for DOS commands.
❒ **DOS TUTORIAL V4.4** (256) - Menu-driven tutorial that teaches DOS commands, terms, etc.
❒ **PKPAK V3.61 & ARCMASTER V2.41** (244) - The complete & fastest archiving/dearchiving program available.
❒ **PC-DESKTEAM V2.01** (278) - Sidekick like utility plus more features. **NEW...**
❒ **AUTOMENU V4.50** (280) - Excellent menu program for your hard drive. Password protection & more.
❒ **FLU-SHOT PLUS V1.4** (541) - Various programs to protect against trojan horses & the 'virus'. A MUST FOR ALL !
❒ **LIST V6.2A** (274) - Best utility for viewing documentation. A MUST. for any ASCII file.

WORD PROCESSING

❒ **GALAXY V2.4** [11) - Easy to use word processor; menus & quick keyboard commands.
❒ **PC-WRITE V3.0** (784-786) - (3 disk set) Full featured word processor; all the features of the expensive ones. **NEW...**
❒ **SAIL TEXT EDITOR V3.0** [376) - A powerful & fast text editor with on-line help screens, & many more features.
❒ **MAXI-MAX** [669) - Contains over 65 macros & templates for Wordperfect V4.2
❒ **WORDPERFECT MACROS FOR V5.0** [189) - Contains over 80 macros.

WHAT'S NEW?

❒ **AMTAX 1988 Version** [428) - Prepare & print complete tax returns for form 1040 & Schedules A - SE.
❒ **BILLPOWER PLUS V4.1** (794 & 795) - (2 disk set) A timekeeping, billing, & bookkeeping program designed specifically for small firms. 350K & hard drive required.
❒ **PC- PROFIT V3.1** (612) - Business plans and ideas for part-time or homebased businesses.
❒ **PC-REVIEWS** (771) - Contains evaluating on many brand name computers, printers, software, books, etc..
❒ **SERVICE PLUS V2.645** (790 & 791) - (2 disk set) The ultimate maintenance & service call tracking system. 640K & 2 floppy drives required.
❒ **PCSHIFT V1.01** (798) - An employee time scheduling application where you can schedule employees by dept. or location & by position within each department or at each location.
❒ **PCLOAN4 V4.07** (799) - Does loan calculations & amortization schedules. Super!
❒ **DESKJET FONTS / 1** (805) - Contains 10 pt. Roman, Helvetica, Times-Roman, & Script. Included are utilities for downloading & sample printouts. HP Deskjet required.
❒ **SAILING IN THE BERMUDA TRIANGLE** (757) - A graphics adventure game. Rescue swimmers and rafters stranded in the water. CGA required.
❒ **SLIMMER V1.0** (816) - This program is designed for you who are a little overweight and are looking for an effortless way to lose a few pounds.
❒ **VGA PAINT V1.1** (808) - A graphics drawing program that produces screen images in up to 248 colors at once. VGA monitor required.
❒ **BALLOON SPELLER** (809) - A program for use in the home or school. Play three different spelling games using lists of words you input.
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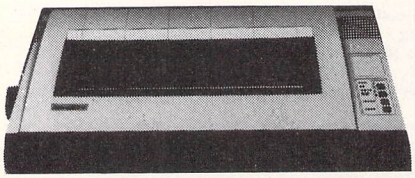

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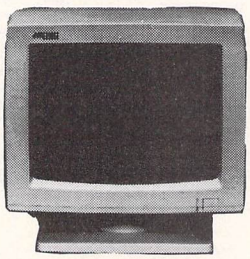

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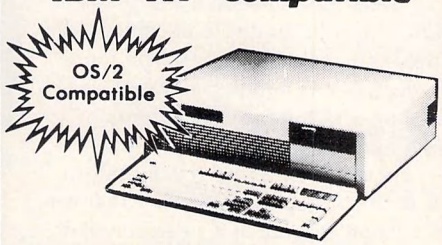

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Oswald. Cooper must also meet with Kennedy himself in order to convince him not to go to Dallas.

The game package includes a mission manual, which contains detailed itineraries and biographies of all the historical figures of the game, and a 90-page novella that describes the circumstances leading up to the trip back in time.

Guardians of Infinity requires a minimum of 512K of RAM and supports CGA and EGA graphics systems. The game can be played without the slide show on a monochrome system. The game's suggested retail price is $44.95.

Paragon Software titles are marketed and distributed through Medalist International, a division of MicroProse Software.

MicroProse Software, 180 Lakefront Dr., Hunt Valley, MD 21030
Circle Reader Service Number 208.

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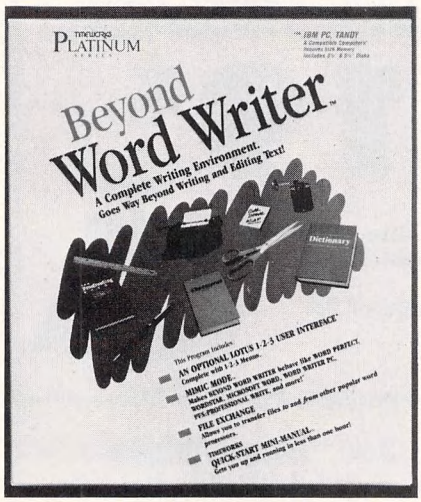
Beyond Writing and Editing

Described as a complete writing environment, Timeworks' *Beyond Word Writer* word processing program features *Quick-Start Mini Manual*, full context-sensitive help screens, pull-down menus, and dialog boxes.



Timeworks' full-featured word processor.

The program includes an optional *Lotus 1-2-3* user interface, a Mimic Mode that imitates other popular word processors, a file-exchange feature that transfers files to and from other word processors, and a transparent user interface that gives users a clear passage from function to function.

Other features that are designed to save users time include a three-way OOPS! control, multiple document windows, and built-in macros. The multiple document windows allow users to work on a number of documents simultaneously.

Beyond Word Writer has a built-in 100,000-word spelling checker that can be used as an online, a full-document, or a single-word spelling checker. A built-in proofreader and a memory-resident thesaurus with over 240,000 synonyms are also included with the program.

Part of the Timeworks Platinum Series, *Beyond Word Writer* has a suggested retail price of $199.95. Both 3½- and 5¼-inch disks are included in the package.

Timeworks, 444 Lake Cook Rd., Deerfield, IL 60015
Circle Reader Service Number 209.

Wise Old Dinosaur

Sunburst Communications has introduced a dinosaurlike creature named *Digitosaurus* in its latest educational software release of the same name. Students in grades 2–6 are challenged to solve whole-number math problems in addition, subtraction, multiplication, and division. Teachers can also set up the program for students to sharpen their estimation skills.

As students progress through the program, Digitosaurus grows older and wiser with every correct solution.

Digitosaurus has a suggested retail price of $65.00. The complete package includes the program disk, a backup disk, and a teacher's guide. The program requires a minimum of 128K on an IBM PC or PCjr, and at least 256K on a Tandy 1000.

Sunburst Communications, 39 Washington Ave., Pleasantville, NY 10570
Circle Reader Service Number 210.

Pack It In

Jensen Tools has introduced a line of high-density polyethylene shipping containers that fit most PC systems. Each case is filled with one- and two-inch layers of polyester foam, which you can customize to match specific equipment configurations. A knife is included with the package.

Ten standard sizes are recommended for IBM PS/2, IBM XT, and IBM AT systems; PC compatibles; Compaq Portable III systems; legal- and letter-size PC printers; and monitors up to 18 inches square.

You can ship your PC in a Jensen container.

The containers also feature a heavy-duty aluminum tongue-and-groove valance with a live-rubber gasket to seal out dust and moisture, military-style hardware with positive quarter-turn latches protected by molded-in ridges, a spring-loaded handle, and padlock eyelets.

Additional sizes and configurations are available on orders of 25 cases or more. Custom designs are also available.

Jensen Tools, 7815 S. 46th St., Phoenix, AZ 85044
Circle Reader Service Number 211. **PC**

Compiled by Mickey McLean

BUYER'S GUIDE

Sports Games

Have you ever wanted to pitch to Wade Boggs, go one-on-one with Michael Jordan, sack John Elway, play 18 with Jack Nicklaus, or win an Olympic gold medal? With your IBM PC or compatible and the software titles listed in this buyer's guide, you can do all of these things and lots more. So warm up your PC—it's time to play ball!

MICKEY MCLEAN

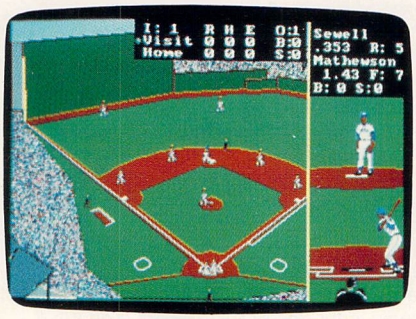
BASEBALL

Earl Weaver Baseball
Electronic Arts
CGA required
$39.95

Earl Weaver and Eddie Dombrower coauthored this baseball simulation, which allows users to experience many aspects of the game, from playing ball to building a stadium. The arcadelike play mode uses hi-res graphics and sound to pit two teams against each other, including some of the All-Star teams from 1901–1975. Users can also take the role of manager—consulting with Earl Weaver to set lineups, trade and draft team members, or relieve pitchers. Managers can also build their own All-Star teams and keep the statistics using the built-in compiler; there are 90 statistical measurements. Game players can play in one of the 26 major league parks or design their own ball park. Instant replay (in three speeds), slow motion, and freeze frame help to simulate actual TV coverage. Separate data disks are also available, including team disks from the 1987 season.

Full Count Baseball
Lance Haffner Games
$39.99

Full Count Baseball is a baseball strategy and simulation game in which the player manages the team. The game includes 26 teams from the most recent season and 52 past National and American League teams. Each team offers 17 batters and 12 pitchers. Players can use the teams provided or build their own teams through drafting and trading. As manager, the player can choose the lineups, batting order, bunts, sacrifices, steals, and more. The game takes into account variables such as player statistics, fielding range, speed, platooning, and the effect of the ball park. A stats compiler automatically records player and team statistics, and a box score can be printed at the end of the game. Play options include player vs. computer manager, two-player, and autoplay. Additional team disks can be purchased for $14.99.



Earl Weaver Baseball's *split-screen viewpoint.*

HardBall!
Accolade
256K, 384K required for Tandy
CGA, EGA, and Hercules supported
$14.95

A baseball simulation, *HardBall!* offers a 3-D perspective of each field angle. Different screens provide the strategy selections for the managers. There are six pitches that can be thrown by left- or right-handed pitchers, and players appear in large-sized graphics.

Micro League Baseball I
Micro League Sports
CGA required
$39.95

Players manage actual big-league players in this baseball simulation. Teams can be selected from the current season or from previous seasons. Additional team disks are available, including all major league teams from the past six seasons, World Series and All-Star teams, and star players from the history of a particular franchise. The actual players play up to their potential based on their statistics and play better if managed properly. Two players can go head-to-head or one player can compete against the computer. A box-score/stat-compiler disk can be purchased separately.

Micro League Baseball II
Micro League Sports
CGA required
$49.95

This updated version of *Micro League Baseball I* includes the Box Score, Stat Compiler, and General Manager disks.

Pete Rose Pennant Fever
Gamestar
Distributed by Mediagenic
512K required
CGA, EGA, and Tandy 16-color supported
$44.95

Players assume the roles of player, field manager, and general manager in this baseball simulation. One or two players can participate in building an expansion franchise over a span of ten seasons. Players draft rookies, purchase free agents, and then put them on the field to perform. The action on the field—batting, fielding, pitching, and base running—is controlled by the player.

ProChallenge Baseball
JBE Ltd.
CGA required
$39.95

This officially licensed computer baseball game features ten different game and help screens and complete player lineups from all 26 major league teams. Players can choose from 18 defensive formations and 20 offensive signals as they call all of the shots as manager. The game also features a slow-down feature, allowing a user to match the speed of the game to the speed of the computer.

Pure-Stat Baseball
Software Simulations
Distributed by MicroProse
Monochrome or CGA required
$39.95

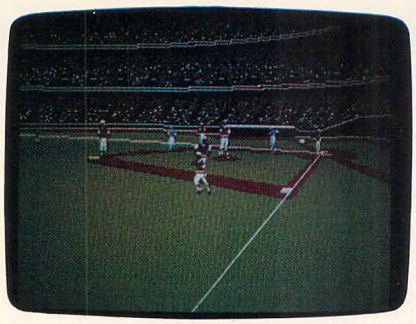
This statistical-replay baseball simulation can be played with one or two players. Individual statistics determine the outcome of the game. You can choose from every team of the 1985 season in addition to eight classic teams from the past and present. You can also trade players between teams to form a dream team. A stat keeper compiles all player statistics and calculates batting averages and ERAs. Statistics can be printed out at any time. The computer can play a game without graphics in three minutes. Players choose from three different stadium locations. An optional stadium disk is available for $19.95. A 1987 team disk sells for $19.95, and a create-a-team disk is $14.95.

Slugger
Mastertronic
CGA required
$9.99

Slugger is a computerized version of a game of baseball.

The Sporting News Baseball
Epyx
512K required
CGA, EGA, and Hercules supported
$39.95

In this simulation, players can compete against each other or against the computer, or they can set the computer to play itself. Multiple screens provide a variety of views of the action, and all the action is influenced by the actual statistics and capabilities of the ball players. Batters can hit and run, bunt, or pull the ball. Other plays include stealing bases,



Defensive view in Pete Rose Pennant Fever.

pick-offs, and brushback pitches. Teams can be chosen from 26 major league clubs, or players can create their own teams from a field of over 100 famous All-Stars. The game includes color graphics and ball-park sound effects.

Street Sports Baseball
Epyx
CGA required
$19.95

This game is played on a neighborhood diamond made from trash-can lids and old tires, and the players are neighborhood pals. There are 16 players to choose from, and each has an individual level of skill in hitting, fielding, and throwing. Players also have to be able to avoid tree stumps, bushes, and puddles. The pitcher can throw four balls—fast, slow, right curve, and left curve. There's a split-screen view of the field, with one screen being a bird's-eye view. For one or two players.

The World's Greatest Baseball Game, Enhanced
Epyx
CGA and EGA supported
$19.95

One or two players can manage and control or just manage a baseball team, using one of the 75 teams provided for creating a team. Players include actual World Series and All-Star teams, teams from the 1984–1985 season, classic players, and current stars. Actual statistics for players are included. The game includes trading functions and trivia questions.

FOOTBALL

4th & Inches
Accolade
256K, 384K required for Tandy
CGA, EGA, Hercules, and Tandy 16-color supported
$39.95

4th & Inches features three screens—a scrolling football field, a statistical screen that shows the players' performance and personal records, and a play menu from which to choose offensive and defensive plays. The game incorporates 22 players, the football, and the ball's shadow. The view of the field is from the press box, with the action following the player with the ball. The players' energy levels decline as the game progresses. The game is for one or two players. The *4th & Inches Team Construction Disk* allows players to create their own teams. The game retails for $14.95.

GFL Championship Football
Gamestar
Distributed by Mediagenic
CGA required
$42.95

This football simulation is played using an on-the-field perspective. The action takes place on the field, where the user is actually running plays and taking hits.

John Elway's Quarterback
Melbourne House
Distributed by Mastertronic
CGA and Hercules supported
$29.99

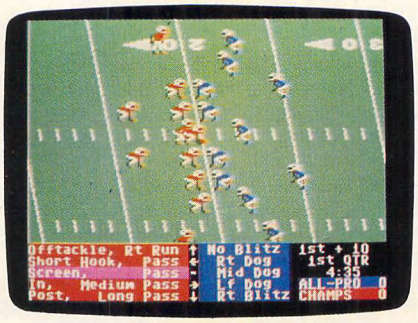
Based on the arcade game of the same name, *Quarterback* requires strategy and playing ability. Players call the plays and then carry out the action on the field. Features include a choice of all 28 NFL teams, arcade-style graphics and animation, and digitized sound effects.

NFL Challenge
XOR
320K required
Monochrome or CGA required
$99.95

NFL Challenge, licensed by the National Football League, features characteristics of players from all 28 NFL teams, including the ability to pass, run, receive, and block. Two players compete head to head, or one can play against the computer. The computer can also play against itself. The program incorporates injuries, substitutions, and fumbles according to NFL statistics.

PRO Challenge
XOR
320K required
Monochrome or CGA required
$49.95

This scaled-down version of *NFL Challenge* features two equal All-NFL teams. The program includes weighted characteristics, such as a player's ability to pass, run, receive, and block, along with his weight, height, speed, and experience. Each player has a selection of 27 offensive and 14 defensive plays. Fumbles, interceptions, and penalties occur according to NFL statistics. The game features modes for one and two players, as well as a computer-vs.-computer mode.



Players select the plays in 4th & Inches.

Pure-Stat Football
Software Simulations
Distributed by MicroProse
Monochrome or CGA required
$39.95

One or two players can participate in this football simulation game. The performance of the players is determined by speed, power, and catching ability. Users determine their own playing parameters and call all the shots from the sidelines. Players control the quarterback and receivers on offense and one key player on defense. A 1987 team disk sells for $19.95, while a create-a-team disk is $14.95.

Street Sports Football
Epyx
512K required
CGA required
$19.95

Players choose from nine neighborhood guys to make up teams that play on a city street or construction site. Obstacles include oil slicks, trash-can lids, puddles, and parked cars. Plays can be selected from a computerized playbook, or players can design a street playbook of their own. There are advanced and beginner levels of competition.

Super Sunday
Avalon Hill
$19.99
CGA required

With this statistics-based game, each player enters the offensive and defensive plays for his or her team and then watches as the game is played. There are 20 Super Bowl teams to choose from, and season disks for the champions are available separately. The game also contains solitaire and autoplay options. A *General Manager's Disk* is available for $30.00, and a *Champion Disk* and *1984–1987 Season Disks* are $20.00 each.

3 in 1 College & Pro Football
Lance Haffner Games
$39.99

As the coach in this pro-football strategy game, the player can choose from 14 offensive and 6 defensive plays, call timeouts, use the two-minute drill, and compare scouting reports. The game can automatically compute individual and team statistics and provide a scoring summary at the end of the game. The stats compiler can record statistics for every team and player plus past schedule results for each team. The game includes 176 college teams, 28 NFL teams, and 14 USFL teams. Additional team disks can be purchased for $14.99.

BASKETBALL

Basketball Challenge
XOR
Monochrome or CGA required
$39.95

Players act as coach in this five-on-five real-time college basketball simulation. One or two players can compete or the computer can play itself. Players' characteristics are weighted according to height, weight, position, and skill ratings. Players select from 20 college teams. Player fatigue, substitution, jump balls, and fouls all contribute to the game's outcome.

Basketball: The Pro Game
Lance Haffner Games
$39.99

In this simulation, the player coaches an NBA or ABA basketball team, choosing the starting lineups, substitutions, shot selection, passing, and offensive and defensive styles of play. Statistics on individuals and whole teams for an 82-game season can be maintained with the stats compiler, and a summary of each game can be printed when the game is finished. The program includes 23 current NBA teams, plus more than 100 great teams of the past. Additional team disks are available for $14.99.

Courtside College Basketball
Lance Haffner Games
$39.99

You can coach Division I college basketball teams as they compete for the championship with this strategy game. Options include lineup, substitutions, shot selection, passing, defensive and offensive styles, and the 45-second clock. Statistics for each player include rebounding, passing, defense, shooting ability, and overall-contribution factor. The stats compiler maintains statistics for individual players and the whole team, and a summary can be printed to the screen or a printer at the end of each game. Players can play against a friend or the computer, or they can watch the computer play itself. The game includes 286 teams from the most recent season, plus 70 all-time-great college teams. Additional team disks are $14.99.

Dr. J and Larry Bird Go One-on-One
Electronic Arts
CGA required
$14.95

Players can become either Julius Erving or Larry Bird in this one-on-one action game.

In Fast Break, *two teams battle three-on-three.*

Fast Break
Accolade
256K, 384K required for Tandy
CGA, EGA, Hercules, and Tandy 16-color supported
$39.95

This three-on-three basketball game features full-court action from a television perspective. Players can choose offensive and defensive plays and substitute players. The game is played under professional rules with three-pointers and slam dunks. For one or two players.

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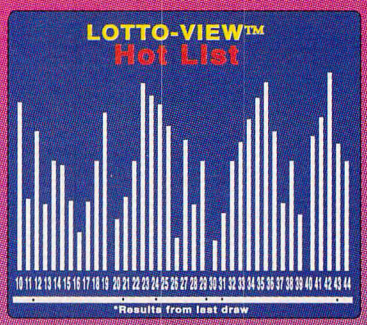

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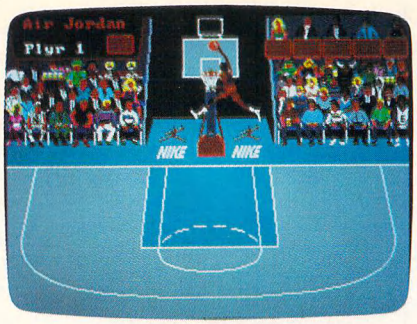


Michael slams one in Jordan vs. Bird.

Jordan vs. Bird: One on One
Electronic Arts
256K, 384K required for Tandy
CGA, EGA, VGA, and Tandy 16-color supported
$39.95

Superstars Larry Bird and Michael Jordan battle on the court in three special events. Players can see who's the best in the One on One battle, the Slam Dunk Competition, and the Three-Point Shootout.

NBA
Avalon Hill
CGA required
$39.95

Players control basketball players of the past and present in this statistical basketball computer game. Users pick the starting lineups and send in substitutes. The program includes 20 great teams from the past and a stat keeper that keeps track of how well each team is doing. The game features three playing modes: head to head, solitaire, and autoplay. The autoplay mode allows the same teams to play several games in a row. Additional season disks are available for $20.00 each.

Pure-Stat College Basketball
Software Simulations
Distributed by MicroProse
Monochrome or CGA required
$39.95

This animated five-on-five basketball simulation game is based on statistics. One or two players can compete or the computer can play itself. Coaching strategy and player statistics determine the outcome of each game. Players can choose from 20 all-time-great college teams. Users can also create their own team by entering statistics. Team statistics can be reviewed or printed at any time. Optional team disks are available. Separate tournament disks sell for $19.95 and a create-a-team disk retails for $14.95.

Slam Dunk
Mastertronic
CGA required
$14.99

This simulation of two-on-two basketball features slam dunks, lay-ups, and alley-oops. The program also keeps track of player statistics.

Street Sports Basketball
Epyx
CGA or Hercules required
$19.95

One or two players compete in this neighborhood-style basketball game. The court is set up in a schoolyard, alleyways, or a park, and three players for each team are chosen from ten neighborhood dribblers. Much of the strategy involves how well each player has put together his or her team and how well the hoop shooters can avoid local obstacles, such as oil slicks and fences.

SOCCER

Go head-to-head in Mindscape's MISL Soccer.

MISL Soccer
Mindscape
CGA required
$39.95

Players assume the roles of player, coach, and general manager in this simulation game based on the Major Indoor Soccer League. Coaches can choose lineups and make substitutions. The General Manager can attempt to build a successful MISL franchise by drafting and trading players. The onscreen players can attempt headers and assorted kicks. For one or two players.

Street Sports Soccer
Epyx
512K required
CGA required
$19.95

Another in the Epyx line of street-sports games, *Street Sports Soccer* enables players to take part in a fast, street-style soccer game. Players first choose a field either in a park or on a city street and then recruit a three-member team from the neighborhood kids. Each character has his or her own personality and skills for heading the ball, executing shots, and controlling passes. There are few rules and no uniforms or sportsmanlike conduct. Teams can play each other or play the computer with a time or points limit.

Superstar Soccer
Mindscape
CGA required
$39.95

In *Superstar Soccer*, the player can perform as soccer player, coach, or owner and manager. As center or goalie, the player can run, shoot, pass, and even get injured. As the coach, the player calls the plays and sends the team to training camp. The owner/manager trades and recruits team members. One or two players can compete against the computer or each other.

World Trophy Soccer
Mastertronic
CGA required
$49.95

One or two players can compete in this simulation of competitive soccer action.

ICE HOCKEY

Hat Trick
Capcom
CGA required
$29.95

Players compete head to head in this ice-hockey game. Each player controls a goalie and a player on the ice. *Hat Trick* is based on the Bally arcade game.

International Hockey
Artworx
CGA required
$19.95

The fast action of hockey is recreated in this game for players ages 8 and older. *International Hockey* includes body checks, fighting penalties, puck passing, graphics, and sound effects such as crowd noise, organ music, and digitized speech. One or two players can compete on three skill levels.

Superstar Ice Hockey
Mindscape
CGA required
$39.95

One or two players face off against each other or the computer. In this multilevel game, the player can be the owner and general manager, trading and recruiting players or sending the team to a training camp. As head coach, the player can set and change the lines and plan the strategies. Or, the player can act as goalie or center and play on the team. This simulation allows for two-on-two, four-on-four, or six-on-six games. A team can compete against 19 other teams in four divisions for up to nine seasons.

GOLF

California Pro Golf
Mastertronic
CGA required
$9.99

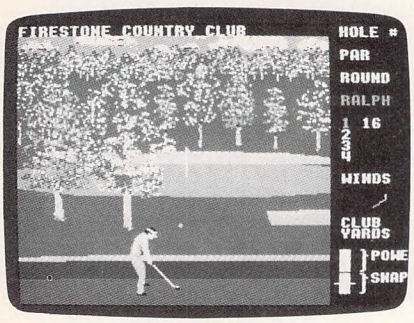
California Pro Golf features an 18-hole golf course complete with hazards. Players have touch-sensitive control of the shots and a choice of clubs.

Jack Nicklaus' Greatest 18 Holes of Major Championship Golf
Accolade
384K required
CGA, EGA, Hercules, and Tandy 16-color supported
$49.95

Jack Nicklaus' Greatest 18 Holes of Major Championship Golf is based on the recently released videotape from the ABC Sports Video library. This golf simulation features Nicklaus's favorite 18 holes of major championship golf along with two additional Nicklaus-designed courses. Players can compete against up to three other human opponents, a computerized Jack Nicklaus, or a variety of computerized men and women. Other features include a choice of Skins scoring or stroke play; pro, men's, or ladies' tees; wind intensity and direction; and uphill or downhill lies.

Mean 18
Accolade
CGA, EGA, Hercules, and Tandy 16-color supported
$44.95

With this golf game, one to four players can play famous golf courses such as Pebble Beach, St. Andrews, and Augusta. The courses include a driving range and putting green. Using the Golf Course Architect Set, players can design their own courses, complete with sand traps, water hazards, and trees. Players compete against other computer golfers in online tournaments by using *Mean 18* on the Computer Sports Network. Additional course disks are available. *Course Disk II* sells for $19.95. Packages including *Course Disk III* and *IV* and *Course Disk V* and *VI* retail for $34.95 each.



Play top courses in World Class Leaderboard.

World Class Leaderboard
Access
CGA or Tandy 16-color required
$44.95

Three famous 18-hole golf courses are reproduced in this golf game, including distance, traps, trees, rough, and water hazards. Players can tee off at St. Andrews, Doral, and Cypress Creek. A fourth course, the Gauntlet Country Club, was designed for this program. The program also offers a printout of the scorecard, an editor to rearrange the holes, a top view of each hole, a practice putting green, and driving ranges. Additional courses are available. Volume I contains Harbour Town, Sunningdale, Dorado Beach, and a course designed by Access, Pine Ridge. Volume II includes Pebble Beach, Muirfield, Colonial Country Club, and the Access course Glenmoor Country Club. Additional course disks are available for $19.95 each.

World Tour Golf
Electronic Arts
CGA required
$14.95

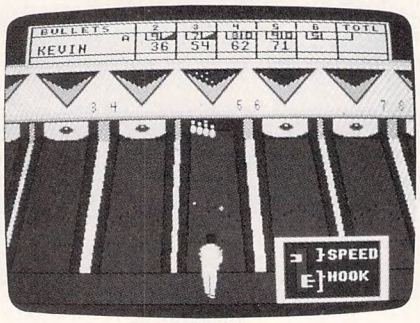
Players can choose from 12 of the world's greatest golf courses or become an architect and design their own course. Courses include St. Andrews, Pebble Beach, Augusta National, and Shinnecock Hills. The program also includes a championship course made up of the world's most difficult holes. One to four players can participate, with a choice of either match or medal play. Players can also compete against up to three computer golfers and set characteristics for each. Split-screen animated graphics give both an overhead view and a golfer's-eye view of the hole. In addition to normal hazards, players will encounter random weather conditions each time they play. Players can also practice on the driving range and putting green.

TENNIS

Serve and Volley
Accolade
CGA, EGA, Hercules, and Tandy 16-color supported
$39.95

Serve and Volley requires players to use correct ball placement, timing, and stroke selection. Users choose from three difficulty levels and three court surfaces. Game activity can be viewed from a full-court perspective with action windows. Players first select a serve type and then hit volleys, forehands, backhands, smashes, and lobs. The game offers match or tournament play against the computer or for two players against each other. Each tournament or match can be saved and resumed.

BOWLING



Go for the spare in 10th Frame, *from Access.*

10th Frame
Access
CGA required
$44.95

Up to eight players can participate in this bowling game. There are several levels of play, including league competition. Scoring is automatic.

BILLIARDS

Rack 'Em
Accolade
CGA, EGA, Hercules, and Tandy 16-color supported
$39.95

Players can compete in snooker, bumper pool, straight pool, eightball, and nineball. Variables such as the object ball and pocket, aim, English, and power affect gameplay. A restore-shot feature allows the last shot to be retaken. Players can attempt trick shots and save the best ten. *Rack 'Em* includes a generic game that allows players to set their own rules. A bumper-pool construction set allows players to create their own bumper-pool tables. For one or two players.

BOXING

Sierra Championship Boxing
Sierra On-Line
CGA required
$14.95

Some of boxing's most famous bouts can be recreated with this game, or players can create new matches using a list of 50 former and current boxers. As trainer, the player plans a strategy and determines the height, weight, stamina, and best punch for the contender. In the arcade mode, players can fight each other or the computer. Two manuals explain the art and strategy of boxing and the history of the sport.

Star Rank Boxing II
Gamestar
Distributed by Mediagenic
CGA required
$34.95

Two players can play each other or one player can challenge the computer in a battle for the boxing title. Each boxer must defeat four challengers on the way to the championship; challengers become more skillful as the match progresses. In the exhibition bouts, boxers can fight in welterweight, middleweight, or heavyweight classes, with up to five boxers in any one class. Players create a training regimen for their boxers and improve their skills in blocking and ducking punches, throwing crosses, jabbing, uppercutting, and taking body shots. A tale of the tape containing the boxer's statistics and record appears before each fight.

T.K.O.
Accolade
CGA, EGA, Hercules, and Tandy 16-color supported
$39.95

This arcade-style, split-screen boxing game features a first-person perspective, allowing players to get a feeling of being in the ring. Players can use both offensive and defensive maneuvers, including dodging and ducking punches. When hit, each boxer's face shows the damage sustained, including black eyes, fat lips, swollen cheeks, a bruised forehead, and a cut jaw. For one or two players.

WRESTLING

Bop'n Wrestle
Mindscape
CGA required
$29.95

Gorgeous Greg fights for the professional wrestling championship belt against ten other contenders with moves like the airplane spin, back breaker, drop kick, full Nelson, pile driver, stump, and flying body-press. Two players can control opposing contenders, or one player can challenge the computer. The action takes place in a 3-D ring and requires either joystick or keyboard input.

Tag Team Wrestling
Data East
CGA required
$19.95

The player and a partner can use body slams, drop kicks, back breakers, and flying head butts to defeat opponents and win the championship belt. You must pin your opponents for a count of 3 or throw them out of the ring to win.

RACING

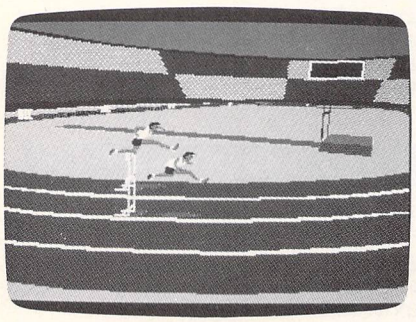
Grand Prix Circuit
Accolade
384K required for CGA support
512K required for EGA, Hercules, and Tandy 16-color support
$49.95

Grand Prix Circuit simulates the Formula One season. Players can choose to race for the McLaren, Ferrari, or Williams team on a Grand Prix course in Monaco, Germany, or Japan. The ultimate goal is to win the World Driving Championship in this competition against a diverse group of racing rivals.

OLYMPIC-STYLE COMPETITION

California Games
Epyx
512K required
CGA, EGA, and Hercules supported
$39.95

Up to eight players can take part in this survey of California-style recreation. Games include surfing, throwing flying discs, skateboarding, roller skating, and riding BMX bicycles.



Run hurdles in The Games: Summer Edition.

The Games: Summer Edition
Epyx
512K required
CGA, EGA, VGA, and Hercules supported
$49.95

The Summer Edition is the official computer game of the 1988 U.S. Olympic Team. Players participate in events such as the hurdles, pole vault, uneven parallel bars, rings, springboard diving, and velodrome sprint cycling. The action can be viewed from first-person perspective or camera-angle points of view. Players can attend opening, closing, and awards ceremonies.

The Games: Winter Edition
Epyx
512K required
CGA, EGA, VGA, and Hercules supported
$49.95

Players compete in seven Winter Olympic trials—oval-track speed skating, downhill skiing, slalom, luge, ski jump, figure skating, and cross-country skiing. The screen can display camera-angle points of view to resemble actual television coverage, and in the downhill-skiing competition, players can position the cameras to monitor their performance. Up to eight players can take part in the events, based on the Olympic competition held in Calgary, Alberta, Canada, in 1988. The game was designed with assistance from the U.S. Olympic Team affiliates and videotapes from the U.S. Olympic Committee.

Summer Games II
Epyx
CGA and EGA supported
$19.95

Up to eight players can compete against the computer or each other in this representation of the Summer Olympic games. Events include rowing, triple jump, javelin throwing, high jumping, fencing, cycling, kayaking, and equestrian events. There are also opening ceremonies, national anthems, and medals.

Winter Challenge
Thunder Mountain
Distributed by Mindscape
512K required
CGA required
$14.95

One to six players can compete in five winter events: ski jump, downhill skiing, bobsled, giant slalom, and biathlon.

Winter Games
Epyx
EGA, CGA, VGA, Hercules, and Tandy 16-color supported
$19.95

This game lets players take part in seven of the Winter Olympic games, including figure skating, bobsledding, and the biathlon. The game includes the opening ceremonies and national anthems. For one to eight players.

World Games
Epyx
CGA, EGA, VGA, Hercules, and Tandy 16-color supported
$19.95

Players take the part of athletes representing 18 countries as they compete in some not-so-common athletic events. There's cliff diving in Mexico, sumo wrestling in Japan, weight lifting in Russia, bull riding, barrel jumping, log rolling, the caber toss, and the giant slalom. A history guide and travelogue are included, as well as seven options of practice and competition. For one to eight players.

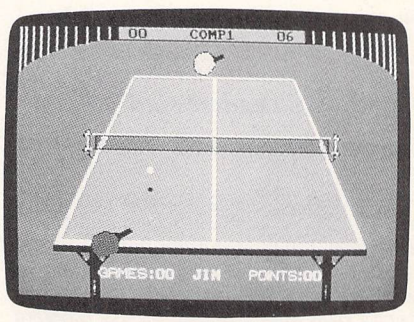
MISCELLANEOUS

Daily Double Horse Racing
Artworx
CGA required
$19.95

This horse-racing game simulates a day at the races. A 16-page racing form is included with the package that features results on 180 different horses from 400 prerun races. Players can choose from 12 jockeys and four turf conditions. The program allows players to place bets on the horses before it runs the race.

Final Assault
Epyx
CGA required
$39.95

Thrill seekers can practice climbing some of the world's most treacherous peaks with this mountain-climbing game. Mountain climber Eric Escoffier provided design assistance for the rock faces, glaciers, crevasses, and chasms found along the trails. Players choose which supplies to backpack from over 50 items. Onscreen variables include temperature, time, altitude, and the physical state of the climber. There is a training course before the climb, and a safety guide is included.



Indoor Sports *features table tennis.*

Indoor Sports
Mindscape
256K required
384K required for DOS 3.2 or higher
$29.95

This sports package contains four different indoor games—air hockey, table tennis, bowling, and darts. Players can compete against each other or the computer. The program includes 3-D graphics and animation. **PC**

For more information about the products discussed in this buyer's guide, contact the manufacturers at the addresses listed below:

Access
2561 S. 1560 W
Woods Cross, UT 84087

Accolade
550 S. Winchester Blvd.
Suite 200
San Jose, CA 95128

Artworx
1844 Penfield Rd.
Penfield, NY 14526

The Avalon Hill
Game Company
4517 Harford Rd.
Baltimore, MD 21214

Capcom U.S.A.
1283-C Mountain View/
Alviso Rd.
Sunnyvale, CA 94089

Data East
470 Needles Dr.
San Jose, CA 95112

Electronic Arts
1820 Gateway Dr.
San Mateo, CA 94404

Epyx
P.O. Box 8020
600 Galveston Rd.
Redwood City, CA 94063

Gamestar
Distributed by Mediagenic
3885 Bohannon Dr.
Menlo Park, CA 94025

JBE LTD.
869 Younge St.
Suite 110
Toronto, Ontario
Canada, M4W 2H2

Lance Haffner Games
P.O. Box 100594
Nashville, TN 37210

Mastertronic
711 W. 17th St.
Unit 9G
Costa Mesa, CA 92627

Melbourne House
Distributed by Mastertronic
711 W. 17th St.
Unit 9G
Costa Mesa, CA 92627

Micro League Sports
2201 Drummond Plaza
Newark, DE 19711-5711

Mindscape
3444 Dundee Rd.
Northbrook, IL 60062

Sierra On-Line
P.O. Box 495
Coarsegold, CA 93614

Software Simulations
Distributed by
MicroProse
180 Lakefront Dr.
Hunt Valley, MD 21030

Thunder Mountain
Distributed by
Mindscape
3444 Dundee Rd.
Northbrook, IL 60062

XOR
7607 Bush Lake Rd.
Minneapolis, MN 55435

PC

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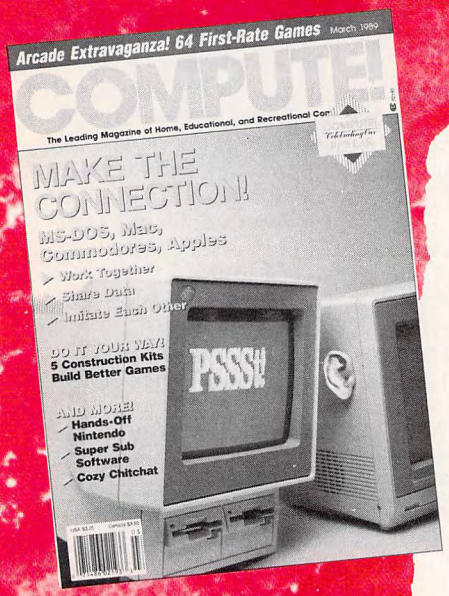

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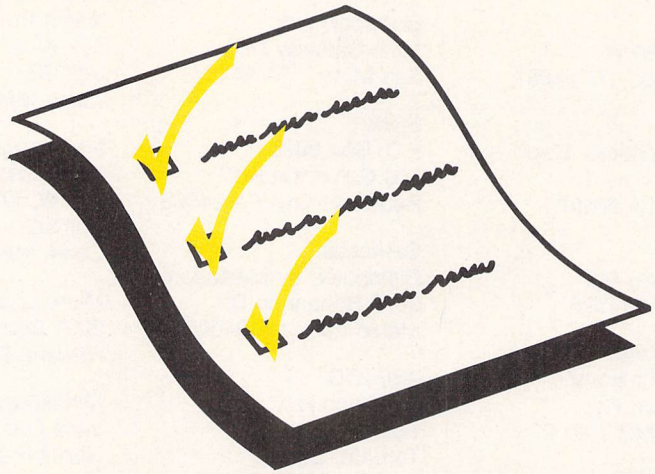
BEST OF THE BOARDS



George Campbell

When you look at the disk in each issue of *COMPUTE!'s PC Magazine*, you find several programs selected from the world of shareware and public domain software. You may have wondered how we decide which programs to include on the disk.

Potential programs for "Best of the Boards" come from several sources. Some come directly to me on disk or through my bulletin board service. Details on how to submit programs were printed in the January 1989 issue. I find other programs as I prowl the dark reaches of the telecommunications world.

From my base in California, I explore bulletin board systems all over the country. Commercial systems, such as CompuServe and GEnie, are another rich source of software. Whenever I find a program that seems like a good bet for our readers, I download it and try it.

In a typical two-month period between deadlines for *COMPUTE!'s PC Magazine*, I download between 100 and 200 programs.

Each program gets a trial run on my AT compatible. For some, that's all they get. When a program crashes or locks up my system, I have the fastest ERASE command in the West. Other problems that make me type ERA are programs that don't allow the user to exit without rebooting and software that is slow or awkward to use. I'm very hard to please when it comes to programs for "Best of the Boards."

After I've eliminated the obvious turkeys, the process continues. The next step is to check the survivors very closely. I start by carefully reading each program's documentation, looking for limitations or features that aren't obvious. Next, I check the programs for hidden bugs or dangerous features like viruses.

These tests take quite a while. I run each program through all its routines, trying intentionally to crash it. How does it handle disk errors? What happens if I tell it to print while the printer's off? If the software fails these tests, it won't make "Best of the Boards."

The ones that pass this stage go on to the next step, the search for Trojan Horses and viruses. I use several software techniques to hunt down possible hazards. My techniques are classified TOP SECRET.

By now, the selection of programs has dwindled to about 10 percent of the original candidates. Now it's time for compatibility trials.

I have three PCs: an AT compatible, a 4.77-MHz XT compatible, and a laptop. Programs get a test on each one. If necessary, I also test them on an IBM PS/2 Model 80. Programs that use graphics have to run on CGA, EGA, and VGA equipment, so I try them all.

Since each issue of *COMPUTE!'s PC Magazine* has a theme, the next step is to select programs from the survivors that blend with the theme of the issue. We try to present a variety of programs in each issue, ranging from games and applications to utilities that make computing easier.

Finally, I send a selection of potential programs to the magazine's editorial offices. There, they go through another exhaustive series of tests by the technical staff. They test the programs on several computers, again looking for compatibility problems and other bugs.

Following those tests, the final choices are made for the upcoming disk. Then the ball is passed back into my court. Before we use any program, I have to contact the author to get the latest version and permission to include it on the disk. That's when the real fun starts.

For example, Karl Wagner, the author of the *Subdir* program on this month's disk, lives in Puerto Rico. Unfortunately, I didn't have his address or telephone number. I called information in San Juan, Puerto Rico—no listing. "What about other Wagners?" I asked in my faulty Spanish. There were too many to call. I finally located the author on CompuServe, left him an E-mail message, and he called me one day before my deadline.

My French is even worse than my Spanish, so contacting Jean Lalonde, the author of *SearchIn*, in Quebec was also a test of communications. Fortunately, everyone I spoke with was bilingual.

The last step in preparing the programs for the disk is editing the documentation. I add information on features and installation procedures, then fill in any gaps in the manuals for each program. Occasionally, I have to shorten a manual to fit the program on the disk. That hurts, but I try to keep my cuts to a minimum.

Once everything's done, the programs go back to the main office, usually on the day of the deadline. The post office loves me, since almost everything goes by Express Mail. Another series of tests, and the disk is ready. Then the whole process begins again.

The Shareware World: What's Hot

Last November, I spent a week at COMDEX in Las Vegas. Among the displays of the latest hardware and software, I talked with several shareware authors who had come to introduce new versions of their products.

Jim Button from ButtonWare announced a new version of his famous program *PC-File*. Now called *PC-File:dB*, the program is completely compatible with Ashton-Tate's *dBase III+*.

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BUSINESS/ACCOUNTING/FINANCE

- ☐ **Home Budget Manager (3103)** -Helps you design and stick to a budget.
- ☐ **E-Z Forms Executive (3160)** -Makes it easy to generate any type of busiess form.
- ☐ **Express Check (3105)** - A fantastic checkbook program with reconciliation features.
- 3 **PC-Calc+ (3130-3132)** - One of the most powerful and complete spreadsheet packages available. The features include the ability to import 1-2-3 files. (3 disks)
- ☐ **Small Business Accounting System (3141)** -All small business owners need this one.
- ☐ **Home Inventory (3180)** - Keeps track of all your personal items.
- ☐ **PC-Stock (3124)**- Tracks your stocks and charts the trends. (CGA)
- 3 **PC-Write (3610-3612)** - This word processing system is one of the most popular because of its many features and ease of use. (3 disks)

DATABASE

- ☐ **MailMaster (3207)** - Complete, full-featured mail list manager and label printer.
- 3 **PC-File+ (3213-3215)** - A powerful DBase III+ compatible Database. (3 disks)

EDUCATION

- ☐ **Facts (3525)** - Teaches kids the states, presidents, capitals, etc. (CGA)
- ☐ **Typing Tutor (3550)** - Improve your typing skills with this friendly teacher! (CGA)
- ☐ **Computer Tutor (3562)** - If you are a new user or computer novice, THIS IS WHAT YOU NEED! Learn in a fun, pressure free environment.
- ☐ **Geography (3526)** - Make learning fun with this geography trivia game.
- ☐ **BibleQ (3552)** - Test your Biblical IQ. It's fun, too!

TOP 40 DISK COLLECTION

- ☐ **Spanish I (3505)** - Excellent instruction for the beginning student or world traveler.
- ☐ **Spanish II (3506)** - For those who wish to continue where Spanish I leaves off.
- ☐ **Math Tutor (3529)** - Takes a fun approach in helping kids improve their math skills.
- ☐ **World (3537)** - This menu-driven program makes it easy to obtain information about geography (capitals, countries, and more).

UTILITIES/APPLICATIONS

- ☐ **MasterKeys (3300)** - Like the popular Norton disk file utilities, only better!
- ☐ **Desk Mates (3375)** - A disk full of Sidekick-like desk accessories.
- ☐ **HDMenu III (3379)** - Puts all the programs on your hard disk on an auto booting, one-touch menu! Has security features, unlimited menus, and phone dialer.

- ☐ **Banner Maker (3801)** - Make banners of various sizes and styles with this disk.
- ☐ **PianoMan (3902)** - Record, edit, and then play back your favorite tunes. Also turns the keyboard into a musical instrument ?!

GAMES

- ☐ **Striker (3400)** - Arcade helicopter attack game. Bomb and shoot enemy targets. (CGA)
- ☐ **Baseball (3415)** - A strategy oriented approach to the great game.
- ☐ **Q-Bert (3403)** - Play the famous arcade hit on your computer. (CGA)
- ☐ **Backgammon (3404)** - Play against the computer. Centipede is also included. (CGA)
- ☐ **Monopoly (3405)** - Great color and sound. (CGA)
- ☐ **JetSet (3407)** - A great jet flight-simulator.
- ☐ **Infiltration to IBM (3417)** - In this text-adventure game, you are a secret agent.
- ☐ **RISK (3436)** - For all of us who love the great board game. Conquer the world! (CGA)
- ☐ **PacMan & More! (3421)** - Several arcade hits including two PAC-M N games. (CGA)
- ☐ **Wheel of Misfortune (3422)** - A really fun version of the classic TV gameshow.
- ☐ **Master the Market (3425)** - A stock market simulation game. More options and better all around play than the popular "Millionaire" game.
- ☐ **Kid Games (3426)** - A set of educational games designed to teach kids in a fun way.
- ☐ **Super Pinball (3429)** - A collection of five great video pinball games. (CGA)
- ☐ **Global Thermonuclear War (3430)** - Inspired by the movie "Wargames".
- ☐ **Video Poker/Ultima 21 (3435)** - The BEST poker and blackjack games available.
- ☐ **Star Trek (3438)** - You are the captain as you lead the Enterprise into space battle.

THE BEST of the REST

BUSINESS/ACCOUNTING/FINANCE

- 2 **Fast Bucks (3099, 3100)** - Tracks all your personal finances. Very complete, yet easy to use. (2 disks)
- ☐ **PC-General Ledger (3140)** - Written by a financial exec with over 25 years experience.
- ☐ **Finance 1.0 (3143)** - Determines present and compound values. Useful for bond, loan, and mortage analysis.
- ☐ **Finance Manger II (3145)** - A powerful personal or small business bookkeeping system.
- 2 **Mr. Bill (3171, 3172)** - Complete billing system! Keeps track of accounts receivable and prints invoices and statememts. (2 disks)

WORD PROCESSING/DATABASE

- ☐ **PBase (3200)** - A powerful relational DBase with query language.
- ☐ **Doctor Data Label (3209)** - Has features found only in the best mail list managers.
- 2 **New York Word (3607, 3608)** - Has everything you need such as mail-merge, split screens, macros, spell checking, and more. (2 disks)
- ☐ **Galaxy (3610)** - An easy-to-use menu-driven word processing system. Lots of features.

TELECOMMUNICATIONS

- 4 **Q-Modem (3700-3703)** - A professional modem communications package which is very versatile and easy-to-use. (4 disks)

EDUCATION

- ☐ **French I (3500)** - French for beginners.
- ☐ **French II (3501)** - Continues where French I left off.
- ☐ **Japanese (3510)** - Designed for the business traveler but also useful for the student.
- ☐ **German I (3512)** - An introduction to German.

- ☐ **Are You Ready For Calculus? (3534)** - This is an excellent pre-calculus tutor that review algebra and trigonometry.

UTILITIES/APPLICATIONS

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Another famous shareware program, *PC-Write*, was at COMDEX in a new version. Bob Wallace, its author, introduced version 3.01, which offers a number of new features, including the ability to handle files larger than 60K. Again, the new version is available on all major commercial and public bulletin boards. Registration still costs $89.00. Contact QuickSoft, 219 First North, #224, Seattle, Washington 98109; (800) 888-8088.

If you're looking at DOS shells, take a close look at *PC-Valet*, written by John A. Junod. A new shareware product, it offers all the functions of the popular commercial DOS Shells, such as *Xtree Pro* and *PC-Tools*. The program is very easy to use and even offers mouse support. It's available on CompuServe and GEnie with the filename VALET .ARC. The registration fee is $15.00, but a fee of $25.00 brings you printed documentation and the latest version. Contact The CenterPost Group, Suite 111-189, 15 Churchville Road, Belair, Maryland 21014; (301) 836-5048.

Public Domain Speech Digitizer

The PC has never been famous for its sound system. But I recently encountered a file that can make your PC talk—and not in the usual poor quality of other talking programs, but with a real, digitized voice.

The file explains how to build a digitizer for your PC. Designed by Alan Jones, it connects to a serial port and records sounds through a microphone. The digitized voice is stored as a file. A simple program lets you play these files back on any PC. No external devices are necessary on the playback computer.

I built one of these devices, and the results are amazing. Two files, DIGITE.ARC and HIDI.ARC, are available on CompuServe in Library 4 of the IBMHW SIG. They contain instructions for building the digitizer, plus the software needed and sample speech files. Some technical skill is required, and the cost for the parts is about $20.00.

Next Issue

Along with the usual shareware news and exciting programs on the disk, the next issue's column will feature a review of PC PURSUIT. This service allows you to make unlimited calls to bulletin boards during off-peak hours for a monthly fee of $25.00. It's an ideal way to expand your BBS explorations.

This Issue's Programs

For this issue's disk, I've located five new shareware and public domain programs for you to use and enjoy. A varied group, this set of programs contains something for everyone.

Rich Levin's Checkup

I've been following news on the virus issue closely. The problem, as I've said before, is vastly overrated by the media. Still, many PC users feel some concern about the possibility of encountering a virus.

With that in mind, I've looked at all the shareware virus-protection programs, hoping to find one to present on the *COMPUTE!'s PC Magazine* disk. *Rich Levin's Checkup* is the one I have chosen.

Most viruses infect computers by attaching themselves to one of the MS-DOS system files. They lurk there, waiting to attack. They spread by copying themselves each time you format a floppy disk as a bootable disk.

Rich Levin's Checkup monitors the structure of any files you choose. If the file changes in any way—a symptom of a virus attack—the program warns you. You can then restore the original copies of those files, eliminating the danger.

Before you run the program, it's very important that you read its documentation, contained in the file CHECKUP.DOC. You can use your word processor or a file-browsing utility like JLSCAN (July 1988) to read the file. To print the file, give the command COPY CHECKUP.DOC PRN.

Rich Levin's Checkup is stored on the disk as a self-extracting archive with the name -CHECKUP.EXE. The hyphen (-) indicates that the file is an archive, not a program file. For information on uncompressing the file, see "How to Use the Disk," found elsewhere in this issue.

Please note that, because of limited space, I have edited the documentation for this program. Please don't distribute *Rich Levin's Checkup* in this form. Contact the author for a distribution copy.

This program is a shareware product. The author doesn't request a fee from individual users but asks that all users complete the registration form and mail it in.

Dr. Sleeptite and the Nightmare Factory

This issue's theme is entertainment, so I searched for an exciting game for the disk. *Dr. Sleeptite and the Nightmare Factory*, written by California author Keith Fieler, takes you into a colorful world of dreams and nightmares.

Your role in this game is to thwart the evil Dr. Sleeptite and destroy his infernal Dream Machine and its Nightmare Capsules. Use your joystick or keyboard to move through six levels of a maze of ladders, but be careful to avoid the Killer Pillows!

The program requires 256K of memory and a CGA, EGA, or VGA graphics card. You can configure the keyboard commands to suit your playing style if you don't have a joystick.

You'll find the game on the disk in the self-extracting archive -DRSLEEP.EXE. Follow the instructions in "How to Use the Disk" to extract the files. Instructions for the game are in the file DRSLEEP.DOC.

SearchIn

No matter how carefully you name your files, it's easy to lose track of them. Trying to find a particular letter, report, or other text file in a mass of hard disk directories or floppy disks can be a real chore.

Canadian author Jean Lalonde wrote *SearchIn* to solve those problems. Using it, you can search through your files, looking for specific text. The program can search across directories or through your floppy disks and find your search text quickly and easily.

SearchIn displays all its information in a window, along with the filename and the line number of any text it finds. It's extremely fast and easy to use. The program even supports the mouse.

If you don't have a hard disk, *SearchIn* can search through a stack of floppy disks. One keystroke will repeat a search each time you insert a new floppy disk.

Advanced users will like the option of using the program from the command line. Command-line switches can control all of *SearchIn*'s functions.

SearchIn requires 256K of RAM but doesn't need graphics. You'll find the program in the self-extracting archive -SIN.EXE. Extract the files; then read the instructions in the file SIN.DOC.

Subdir

Subdir helps you move among the subdirectories on your disk. Once you try this program, you'll never use the CD command again.

Written by Puerto Rican author Karl Wagner, *Subdir* displays a menu of your directories. Press the letter associated with the directory you want and you move instantly to that directory. Once there, press Enter to stay in the directory. With another keystroke, you move back to the previous directory.

The program runs on any PC regardless of memory size or display type. *Subdir* is stored on the disk as two files, S.COM and SUBDIR.DOC. Read the SUBDIR.DOC file for information on installation and operation.

Vmusic

When IBM designed the original PC, it never anticipated that the computer would become such a recreational hit. One of the areas the company neglected in the design was music. One note at a time was all you could hear.

That's no longer true. Ted Holden, a Virginian programmer, has written a magical program that allows you to compose and play three-voice, polyphonic music. Unlike some music programs that try to simulate multipart music, *Vmusic* really works.

Vmusic takes over your PC completely, converting a text file into digitized sound, then playing it through the speaker in your computer. The first time I heard its output, I was amazed.

Since different computers operate at different clock speeds, *Vmusic* lets you include numbers that alter the speed and pitch of its song files. You have complete control.

Here's the best part: You can write your own music. *Vmusic* uses the same syntax for its music files as that used in the PLAY statement in BASICA or GW-BASIC. Writing tunes is as simple as using your word processor or text editor. Complete instructions are in the documentation.

We've included several songs with the program, so you can start enjoying it immediately. Due to their number, we've stored the *Vmusic* files in a subdirectory on the magazine disk. To change to the subdirectory, type CD VMUSIC. For more information on using files in subdirectories, read "How to Use the Disk."

VMUSIC requires 256K of RAM and runs on any PC or compatible computer.

Shareware

Dr. Sleeptite and the Nightmare Factory and *Rich Levin's Checkup* are shareware programs. Both require users to register their copies. You'll see registration information in each program's documentation. If you use these programs regularly, please support the authors by registering your copy and paying the fee requested by the author. All registration fees go directly to the author and support further enhancements of the programs. *COMPUTE!'s PC Magazine* provides copies of these programs as a service to its readers. **PC**

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Every issue of *COMPUTE!'s PC Magazine* includes a 5¼- or 3½-inch disk (newsstand copies contain 5¼-inch disks only; subscribers get their choice). If you experience a problem with the disk, please contact us at (919) 275-9809 between 9:00 a.m. and 4:30 p.m. EST, Monday through Friday.

Before you begin using the magazine disk, we highly recommend making a backup copy and keeping the original in a safe place. Follow the instructions below.

Computers with One Floppy Disk Drive:

Put your DOS disk into the drive and enter DISKCOPY. Then follow the instructions on the screen.

Computers with Two Floppy Disk Drives:

Put your working copy of DOS into drive A and enter DISKCOPY A: B: at the DOS prompt. When DOS prompts you, remove the DOS disk from drive A and replace it with the magazine disk. Put a blank disk into drive B and press any key to make the copy.

Running Magazine Programs

Descriptions of all the files on the disk are contained in a file named README. You can display this file on the screen by entering TYPE README at the DOS prompt. Press the Ctrl-S key combination to stop scrolling. You can restart scrolling by pressing the space bar (or any other key). (Some computers have a special Pause key for this purpose.) You can read the file more easily by loading it into your word processor or by printing it with the DOS command COPY README PRN.

Before running the disk programs, follow the instructions in the articles. Remember that some files on the magazine disk are not executable programs; for instance, some files may contain only the data for a program.

Compressed Files

Programs on the disk are sometimes compressed and stored as self-extracting archives. It's easy to identify these files—they all begin with a hyphen (-) and have an .EXE extension.

It's a simple process to uncompress an archive. If you're a beginner or you just want to keep things as simple as possible, follow the instructions under "All Computers," below. If you're a more advanced user, you can follow the instructions under "Computers with One Floppy Disk Drive," "Computers with Two Floppy Disk Drives," or "Computers with Hard Disk Drives," depending on your equipment's configuration.

Just be sure not to try to extract a compressed file on a copy of the magazine disk—there probably isn't enough space on the disk for the files.

All Computers:

▶ Copy the compressed file to a newly formatted disk.

▶ Put that disk into drive A.

▶ At the A> prompt, type the archive name.

Computers with One Floppy Disk Drive:

▶ Have the disk to which you want the files extracted ready.

▶ Put the disk that contains the compressed file into your drive.

▶ At the A> prompt, type *-archive* B:, substituting the name of the compressed file for *-archive.*

▶ Follow the computer's instructions to swap disks.

Computers with Two Floppy Disk Drives:

▶ Put the disk that contains the compressed file into drive A.

▶ Put into drive B the disk to which you want the files extracted.

▶ At the A> prompt, type *-archive* B:, substituting the name of the compressed file for *-archive.*

Computers with Hard Disk Drives:

▶ On your hard disk, make a directory for the files by changing to your hard disk and entering the command MD *directory,* substituting your own directory name for *directory.*

▶ Put the disk that contains the compressed file into drive A.

▶ At the A> prompt, type the command *-archive* C:*directory,* substituting the name of the compressed file for *-archive* and the names of your hard disk drive and directory for C and *directory.*

Directories

Program files are sometimes stored on the disk in directories. You can easily identify directories by typing the DIR command. In the DIR listing, directories are indicated with a <DIR> beside each directory name. If the program is in a directory, simply change to the directory with the command CD *directory* (substituting the directory name for *directory*) before you run the program. To return to the root directory, type CD \.

Programs That Require DOS

Some programs on PCs and compatibles require COMMAND.COM (a DOS file) to operate. Floppy drive systems look for COMMAND.COM on drive A, so it's best to keep a disk with COMMAND.COM in drive A. If there's room on your backup copy of the magazine disk, you can copy COMMAND.COM onto it and run the magazine programs from drive A. If there isn't room, put a COMMAND.COM disk in drive A and the backup copy of the magazine disk in drive B. Then run the magazine programs from drive B.

If the system you're using has one floppy drive and no hard drive, copy COMMAND.COM onto your backup disk, if there's room. If there isn't room, copy some of the programs you want to use from your backup disk to a disk with COMMAND.COM. Then run the programs from that disk.

If the system you're using boots from a hard drive, the computer can find COMMAND.COM on the hard drive. If you boot a hard drive system from a floppy disk in drive A, you should keep a COMMAND.COM disk in drive A.

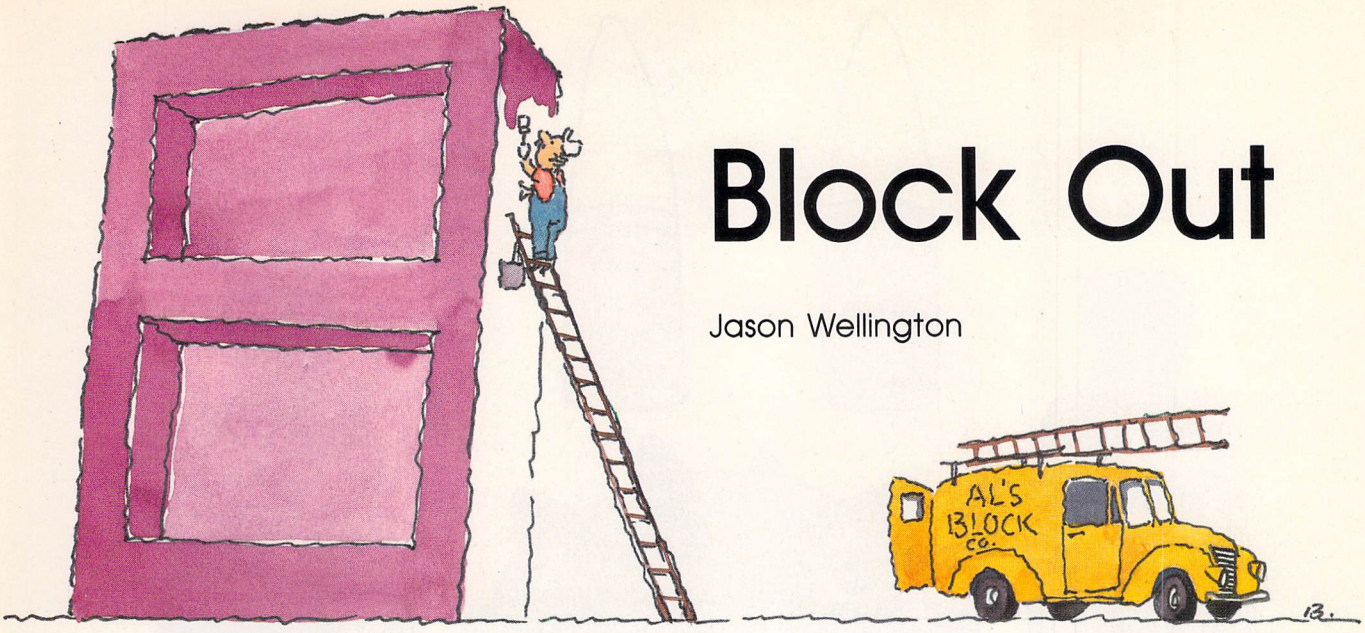
More Tips

▶ Be sure that your graphics system (Hercules, CGA, or EGA) matches the program requirements.

▶ Don't be concerned that your PC disk might have a virus. We get a disk with the latest version of each program directly from the author, and we run a battery of tests on each file to ensure that it's virus-free.

▶ If you can't display a directory of the disk with the DIR command, the disk is probably defective. Return your disk to us, and we'll quickly send you a replacement.

With the exception of the featured programs in our "Best of the Boards" column, the entire contents of *COMPUTE!'s PC Magazine* and the disk are copyright 1989 by COMPUTE! Publications, Inc., all rights reserved. The programs are intended for use by the purchaser of the magazine and may not be distributed to others in any form. We ask that you respect the copyright. **PC**



Block Out

Jason Wellington

Here's a challenging mental exercise—a colorful strategy game for two to four players that features mouse support and two levels of computer play (expert and beginner). "Block Out" runs on any IBM PC, XT, AT, or compatible with at least 256K of memory; DOS 2.0 or higher; and a Color/Graphics Adapter (CGA), an enhanced graphics adapter (EGA), or an equivalent.

Start with four differently shaped tiles and paint each with one of five colors. What do you have? The makings of "Block Out," an addictive strategy game that's so easy to learn, everyone in the family will want to play.

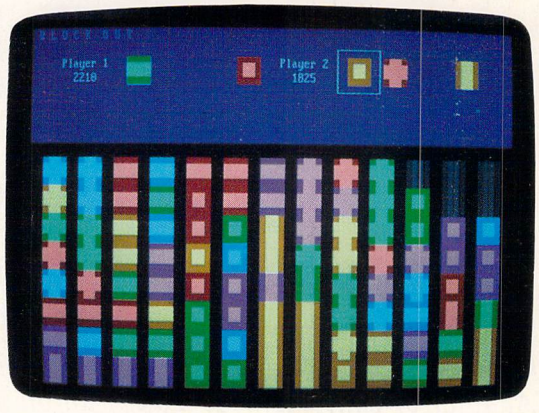
In Block Out, players compete for points as they build a wall of tiles. You get points for placing blocks of the same color or shape next to each other. You get more points if both the color and the shape match.

Getting Started

You'll find Block Out on the magazine disk in the file B.EXE. To play Block Out, type *B* at the DOS prompt. You'll see several choices on Block Out's menu. Use the cursor keys or the mouse to highlight an item on the menu. You can scroll through the item's options by pressing Enter (there are no options for PLAY or EXIT). You can choose team or individual play, mouse or keyboard, and your opponent (human, machine beginner, or machine expert). When you're ready to play, highlight PLAY and press Enter or click the left mouse button. Press Esc to return to the menu at any time during gameplay.

You and your opponent each receive a rack of four tiles. Each tile is designated by one of four shapes and one of five colors: red, green, yellow, magenta, or blue. Players alternate turns in Block Out; player 1 always moves first.

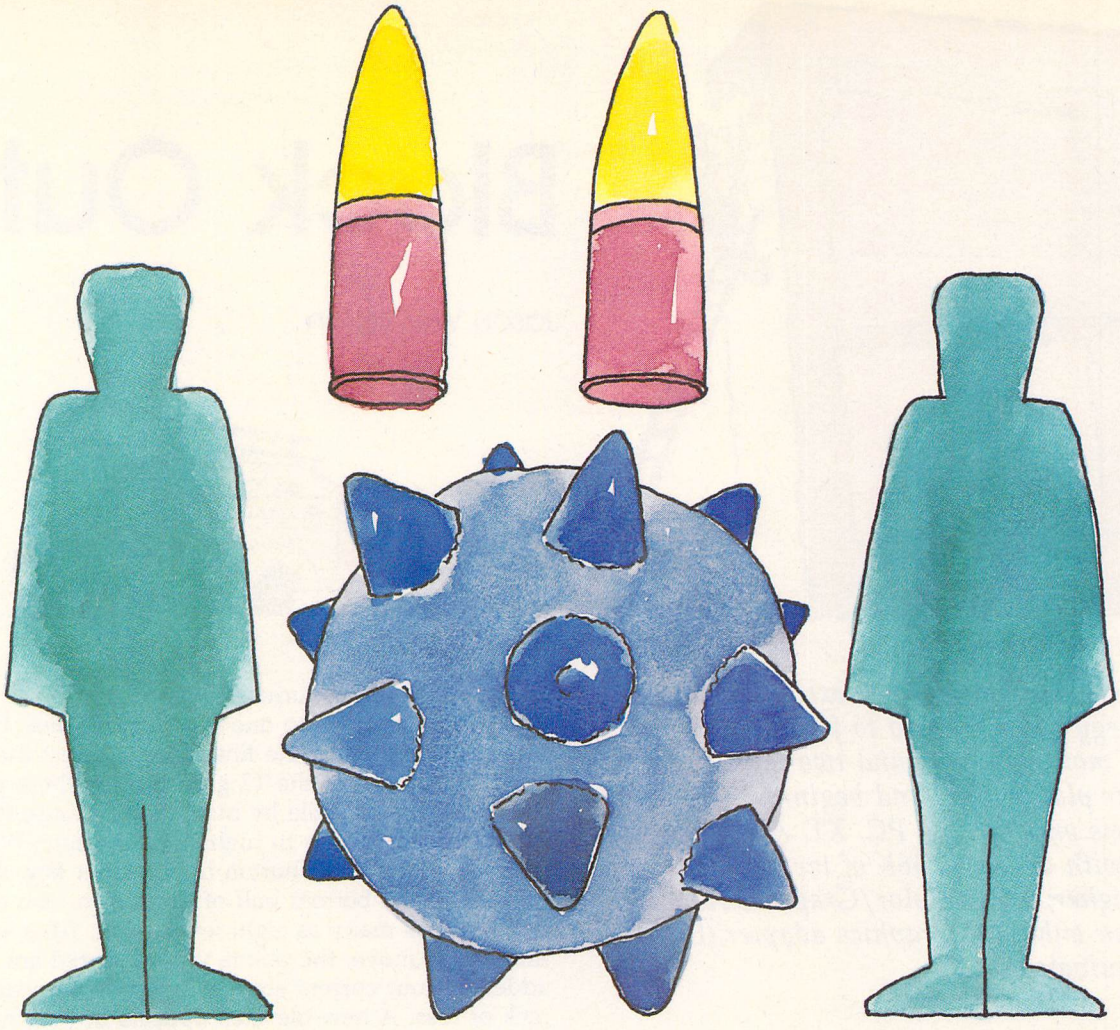
When it's your turn, use the mouse or the cursor keys to move to one of your four tiles. Press the mouse button or the Enter key to select the tile. Now choose one of the 13 gray chutes where you want to place your tile by moving the mouse or using the cursor keys to highlight the chute. When you press the mouse button or the Enter key, the tile falls to the bottom half of the screen. You can stack tiles as many as eight levels high. After you've made your move, the points you've scored are added to your current score and displayed near your rack of tiles. A new tile then appears in your rack.



Match colors and patterns for high scores in "Block Out."

Ways to Score

When you drop a tile next to or on top of a tile that has the same color but a different shape, you're awarded 15 points. If the tile is of the same shape but a different color, you get 25 points. If the tiles match in both shape and color, you score 40 points. Since dropped tiles can touch other tiles in three directions (left, right, and down), the maximum score per play is 120 points. When all the chutes are filled, the player with the highest score is the winner. **PC**



ISKIB

Scott Ramsay

Match wits and reflexes with hordes of invading aliens in this exciting, fast-paced arcade-style game. "Iskib" is a one-player game for any IBM PC, PCjr, XT, AT, or compatible with at least 256K of memory, DOS 2.0 or higher, and a Color/Graphics Adapter or equivalent. It won't run on systems equipped with monochrome adapters.

It's the year 2199, and thousands of alien ships are swarming over the planet Iskib, firing at anything that moves. You've lost communications with the other small Earth outposts spread across the planet. Your mission, should you decide to accept it, is to command a squad of men in a desperate attempt to restore communications with the outposts. This is your only hope to save Iskib from destruction.

To accomplish your mission, you'll need the special weapons and equipment that are scattered across the planet. As you move along the surface, you'll grab extra bullets, hovering ability, and extra firepower. With these, you can shoot the alien robot ships and run from outpost to outpost, restoring communications to working condition. You'll also need to jump over the rocks and mines to avoid your own destruction.

Getting Started

To run "Iskib," enter ISKIB at the DOS prompt. The game asks you whether or not you want to use a joystick. If you choose Y, follow the prompts to set your joystick. If you answer N, the level menu will appear. Choose a level by entering a number from 1 to 3. Next, you'll see a help screen showing the objects encountered during the game and a window that displays the score, level, number of remaining men, number of bullets, special-equipment meter, and jump-power meter. Press any key to play.

If this is your first game, you'll want to choose the beginning level. As a beginner, you can save Iskib by reaching level 10. You have to reach levels 25 and 50 to win in the intermediate and advanced levels.

Stop the Aliens

You begin the game with just 10 bullets and four extra men. You'll find piles of extra bullets scattered along the surface of the planet. Pick up the bullet piles by running over them. You can carry up to a total of 99 bullets.

Press the space bar to shoot at an alien. You're only allowed to shoot one bullet at a time, unless you pick up extra fire or extra fire-and-hover power. Watch out for the rocks, mines, aliens, bombs, and bomb explosions. Running into any of these objects causes you to lose one man. You get an extra man at the beginning of each level.

Use the cursor keys to move right and left and the Enter key to remain stationary. Because of Iskib's low gravity, you're also able to make some impressive jumps. To jump, press J once to put the jump-power meter in motion. Located in the top right corner of the screen, the jump-power meter shows the power available for your jump. Press J a second time to execute the jump.

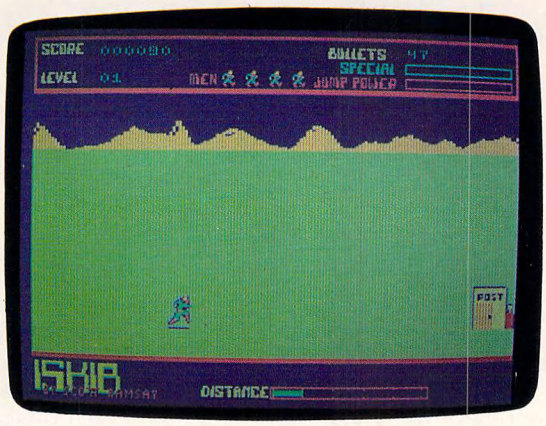
To see how far you've traveled, watch the distance meter at the bottom of the screen. Every time you reach a mark on the meter, you've finished a level. The meter registers five levels at a time and then starts over. All of the levels have extra bullets, but each level has its own combination of aliens, obstacles, and special equipment:

Level	Aliens and Obstacles
1	Large alien ships
2	Large alien ships and falling bombs
3	Land mines
4	Large alien ships and land mines
5	Large alien ships, bombs, and land mines
6	Rocks and mines
7	Rocks, mines, and large and small alien ships

Note: Levels above 7 have all possible obstacles.

Special Equipment

There are three types of special equipment: a hover pack, an extra fire attachment, and a combination extra fire-and-hover. The hover pack allows you to fly through the air. Extra fire increases your firepower by allowing you to shoot three bullets at a time. The combination extra fire-and-hover lets you fly and increases your firepower.



Battle alien ships and save the planet Iskib.

All three types of special equipment have a limited life span. When you pick up any special equipment, the special meter (in the top right corner of the screen) counts down the time remaining before that item malfunctions. The countdown continues whether you use the equipment or not. You can only pick up one type of special equipment at a time, but you can reset the timer by picking up the same type again.

You receive 30 points for shooting down an alien ship, 5 points for jumping over a mine, and 10 points for jumping over rocks. If you lose all your men, you lose the game—and Iskib is destroyed by the alien horde.

You can pause the game by pressing Ctrl–Num Lock; press any key to resume the game. To quit, press Esc and you'll return to the DOS prompt. **PC**

Attention Programmers

COMPUTE!'s PC Magazine is looking for the very best original software to publish on our disk. We welcome every kind of software: full-scale applications for home or office, DOS utilities, programming utilities, educational programs for youngsters, telecommunications programs, memory-resident accessories, games. We pay competitive rates for accepted material. Submit programs on disk with source code and documentation to: Submissions Reviewer, *COMPUTE!'s PC Magazine*, P.O. Box 5406, Greensboro, NC 27403. For more details, write for a free copy of our Author's Guide.

Rack 'Em

David English

In the movie *The Hustler,* Fast Eddie Felson heads straight from the bus station to Ames' Billiards. As he walks in, a man at the counter tells him: "No bar. No pinball. Only pool. Nothing else."

Eddie doesn't pay any attention. He walks right up to Minnesota Fats, smiles, and says, "I shoot straight pool, the expensive kind."

After playing for 12 hours, Eddie is up five grand, but he's starting to fade. "Ace in the side. Eight in the corner. Twelve cross-eyed. Ten. Three. Seven cross-corner. Safe."

At 6:00 a.m., Harry opens the shades a bit and Eddie yells, "Will you cut out that sunshine!"

Fats looks calm and in control. "125. Game." Eddie is in trouble.

Pool Sharks

Rack 'Em gives you the chance to join the ranks of legends like Fast Eddie and Minnesota Fats and become a *computer* pool shark. The game offers a realistic perspective on actual pool. You alternate between an overhead two-dimensional view and a side three-dimensional view. Both views feature animated ball movements and realistic sound (the sound of the balls clicking together).

When you run the program, you'll have a choice of two skill levels—amateur or professional. At the amateur level, two *ghost balls* help you determine the destination for your shot. At this level, it's easy to make a simple cue-ball-hits-one-other-ball shot (combination and bank shots are more difficult). At the professional level, you also use the ghost balls, but here they're set more closely together. This gives you a greater margin of error when you aim but also makes it harder to make the shot. This level more closely simulates the challenge of a real pool game.

Once you've decided on your skill level, you'll need to select the game variation you want to play. You can choose New Game, Trick Shot, Saved Shot, or Demo. If you select New Game, you can make a Custom Game or choose among the games of Straight Pool, Snooker, Eight Ball, Bumper Ball, or Nine Ball.

The layout of the pool table, configuration of balls, opening rack, and scoring change to accommodate the differences of each game. Bumper Ball brings on the unusual-looking bumper-pool table, with its 12 bumpers and two pockets. Snooker has a distinctive opening rack and 22 balls: 1 white cue ball, 15 red balls, and 6 colored balls. You'll find detailed rules for each game in the manual, along with a few strategy tips.

The Custom Game option lets you set up almost any style of game. You start by choosing a ball set (Standard 15, Snooker, 15 Reds, Nine Ball, or Bumper Ball). From there, you can adjust the method of scoring, change the position of the balls, or move the bumpers (if any are used).

If you choose Trick Shots, you'll have a choice of ten shots: Snake, Two Reds, Chain, Blk + Red, Draw Shot, Reflection, Pot Yellow, Corridor, Side Pot, or Symmetry. You can first view the shot to see how it's done and then try to do it yourself. Some are nearly impossible to duplicate, so it's a real challenge to make them yourself.

With the Saved Shot option, you can replay ten of your best shots. As with the Trick Shots, you can either view the shot or try to duplicate it yourself. To save a shot, press F5 just after your history-making shot. Now your friends will have to believe you when you tell them about that three-corner bank shot that sank five balls (each in its proper order, of course).

Set 'Em Up

To play a game, you need to supply your name and your opponent's name (or accept Player 1 and Player 2 as defaults). You won't be able to play the computer—there's no option for a computer opponent. If you decide to play by yourself, you have to play both sides. Next, you need to determine who will break first. You can either decide which player will break or choose the option String to Decide. As in real pool, both players hit the cue ball off the foot cushion, and the player with the ball closest to the head cushion wins the option to break.

Before you can actually take a shot, you have to go through a series of steps that determine the success or failure of your shot. If it's the break shot, the program prompts you to use the keypad's arrow keys to position the cue ball. To select the object ball (the one you're trying to hit), use the arrow keys to move the flashing cursor from ball to ball. Because the balls are too small to be labeled, the bottom of the screen shows the numbers as you move about. When you've selected the one you want, press the space bar. If you want to try a bank shot, press the Tab key to move the cursor through the six cushions. In some games, you're required to call your shot (name the pocket that the ball will drop into). In these games, you'll also use the arrow keys to choose the pocket.

Put a little spin on the ball in Rack 'Em.

Ghosts, English, and Power Pool

You aim your shot using the two ghost balls. One of the imaginary balls (the Object Ghost) appears beside the object ball, showing you where the cue ball will strike. The second ghost ball (the Direction Ghost) appears along the cushion at the Amateur level and at a fixed distance from the cue ball at the Professional level. With the arrow keys, you can accurately aim your ball. Just place the Direction Ghost over a pocket; if everything else goes as it's supposed to, you'll sink your shot.

What would pool be without the option of putting a little English on the ball? English puts the spin on the cue ball that rolls it into the best position for your next shot—or into the worst position for your opponent's next shot. In *Rack 'Em*'s simulated play, you'll see a large ball with flashing crosshairs. Use the arrow keys to move the crosshairs to the spot on the cue ball where you want the cue stick to strike. The manual ex-

plains the results of hitting the ball on different spots: the follow shot, draw shot, and left and right English.

After you've decided on the English, you'll need to decide how hard you want to hit the ball. Using the arrow keys, move the Power bar along its scale, from 0 to 10. Finally, you'll see an animated pool player moving the pool stick up toward and away from the cue ball. Try to press the space bar just as the cue stick touches the ball. The closer you come, the more accurate your shot will be. The next thing you see is your ball moving across the table—on to its predetermined destination. Then it's time to start the whole process over again.

FAST FACTS

Title:	*Rack 'Em*
Category:	Pool game simulation
Features:	Animated 3-D view of table; variety of games and trick shots; ability to customize games; option to save shots
Requirements:	IBM, Tandy, or compatible PC; 256K; DOS 2.0 or higher; graphics adapter
Publisher:	Accolade 550 S. Winchester Blvd. Suite 200 San Jose, CA 95128
Price:	$39.95

Please, Don't Sit on the Table

Like many other excellent games from Accolade, *Rack 'Em* is a realistic simulation of a popular real-life sport. There's plenty of room for complex strategy and intricate one-of-a-kind shots. The option of viewing ten trick shots and ten saved shots, as well as the ability to try them yourself, is just the icing on the cake.

The game's only shortcoming is the lack of a computer opponent—but you wouldn't find that in a real pool game, anyway. All in all, *Rack 'Em* combines excellent graphics with a playable pool game. Fast Eddie and Minnesota Fats would have been proud.

Grand Prix Circuit

Ervin Bobo

Do you need respite from the workaday world of word processors and spreadsheets? Then tighten your seatbelt and try a few laps in *Grand Prix Circuit*. It could be a daydream come true.

This new racing simulation from Accolade puts you behind the wheel of one of three world-class racing cars: a V-12 Ferrari, a V-8 Williams, and a McLaren with Honda Turbo engine. While each car has its own driving characteristics insofar as speed and stability are concerned, the game is shallow. But I think that is intentional.

Drive Hard and Drive Fast

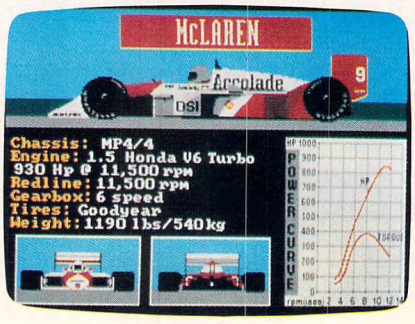
In some racing simulations, you have the chance to build your car from the ground up, altering power plants, spoilers, tires, and so on. In *Circuit*, the most you can do is pull into the pits for a change of tires. Here the emphasis is not on prerace planning or on how fast your pit crews work, but on how well you can drive.

To further simplify matters, the driving is not strategic, but tactical: the kind of driving you do every day on your way to work. Step on the gas when the light turns green, jockey for position, and try to reach the next light ahead of the pack. The difference is that you have more power, more speed, and a track much less forgiving than an interstate. On the plus side, the traffic is one-way.

Begin by choosing to practice. Run a single race or tour the championship circuit, which consists of eight world-famous courses. In the latter instance, you won't finish at one sitting, so provision is made for saving the game. As in real life on the racing circuit, points are accumulated for each race to determine the World Champion.

Next, choose a track. Maps of all eight courses appear with information on length and the number of laps. Some maps have a number of hairpin turns, which may intimidate you, so I'd suggest you start with some of the easier courses. Now, select a race car. In turn, the three cars appear on the screen, and windows give performance statistics and a graph relating to acceleration. You need pay no mind to this information right now. Sure, purists may agonize over selecting the right car for the right race, but just hop in and go.

Your view now is of the car's dashboard, with the steering wheel not quite centered. The instrument panel is very complete, with tachometer, speedometer, fuel gauge, and a damage (to tires and chassis) indicator. Working rearview mirrors show you when someone approaches from behind, while the upper left corner of the screen shows a map with your position on the track. The upper right corner of the screen keeps you informed of lap number and time.



Rev up a McLaren in Grand Prix Circuit.

Qualifying Lap

If you've chosen to race rather than practice, you'll have to qualify by running a single lap at your best speed. Don't worry about qualifying, however; there are ten drivers in the race and only nine slots are filled.

Your real concern will be to run a lap as fast as you can to ensure a good position on the starting grid. When you start from last place—as I've done more times than I care to tell you—you run the risk of bumping the car ahead of you and ending your race in the first moment. Control is by joystick or numeric keypad—though I couldn't make the joystick work at first. The manual says to press the J key for joystick operation, but Ctrl-J is the correct combination. Keyboard control demands a new set of skills. It's difficult to make a good qualifying lap when you spend most of your time in the grass doing 39 mph.

Although there are five levels of difficulty in the game, these don't seem to be selectable. The documentation is not clear on this point, but I have a

feeling that difficulty automatically increases as you prove your skills. It is the Peter Principle applied to racing: Advance until you reach a point where the other drivers mince you.

The differences in levels are in the shifting of gears—automatic in levels 1 and 2—and in the amount and kind of damage your car can receive. In the three upper levels, spinouts are more likely and it's possible to blow an engine, so watch your RPMs closely.

Of the eight tracks in eight different countries, I most enjoyed Monaco. It is not an easy track, there are many annoying turns, but it never takes you through the city streets (or perhaps that course is no longer raced). To make up for that, there is a beautiful sequence where you drive through a tunnel and watch the city skyline emerge as you exit.

FAST FACTS

Title:	*Grand Prix Circuit*
Category:	Formula One racing simulation
Features:	Eight Grand Prix racetracks with five difficulty levels
Requirements:	IBM, Tandy, or compatible PC; 384K of RAM (512K for EGA and Tandy 16-color); single disk drive
Publisher:	Accolade 550 S. Winchester Blvd. Suite 200 San Jose, CA 95128
Price:	$39.95

Emphasis on Action

Documentation is slight, but *Grand Prix Circuit* is not a simulation I consider deep or complicated. There are excellent graphics in the EGA mode, sound is passable—except for an irritating opening theme—and the play is what it was meant to be: an arcade-type challenge in a detailed setting, with emphasis on driving tactics, not strategy.

With those caveats, most users should find *Grand Prix Circuit* an interesting diversion and a welcome respite from the sluggish response of a four-cylinder spreadsheet.

Jack Nicklaus' Greatest 18 Holes of Major Championship Golf

Michael Harrison

Who would have imagined that a twelfth-century Scotsman flailing a bent stick at a small, feather-stuffed leather ball would mark the beginning of one of the hottest sports games ever?

By the year 1457, *golfe* had become such a popular pastime that it was banned by the parliament of King James II of Scotland as a threat to the national security. The people were apparently neglecting their archery practice in favor of a day on the links. While golf is no longer seen as a threat to the national defense, it has become one of the most widely played outdoor sports. With the popularity of computer golf simulations, it could become one of the most widely played indoor sports as well.

Accolade's latest entry in the market, *Jack Nicklaus' Greatest 18 Holes of Major Championship Golf,* brings some unique and exciting features to the electronic golf course. It pits you against computer opponents with a variety of skill levels, offers you the chance to win big money in a Skins-scoring game, and takes you from tee to green on Nicklaus' insightful selection of the greatest holes. You can even challenge Jack, golf's greatest champion, to a match.

As a realistic simulation, *Jack Nicklaus' Greatest 18* aces most of the aspects of the game, but double-bogeys others. It masterfully depicts the rhythm of the golf swing, the trajectory of the ball in flight, and the effects of uphill and downhill terrain on the distance a shot will carry. Unfortunately, the simulation falls short in the sand traps and on the putting greens.

Jack's Picks

Jack Nicklaus' Greatest 18 provides an interesting selection of golf courses. The cream of the crop, Jack's greatest 18, is a handpicked collection of the best holes from the four major golf championships: the U.S. Open, the PGA Championship, the British Open, and the Masters. Here you'll discover why Jack calls the approach to the eighth hole at Pebble Beach his "favorite shot in all of golf." If you want to try a Nicklaus-designed course, you can select Castle Pines, Colorado, or Desert Mountain, Arizona.

Hit the links in Jack Nicklaus' Greatest 18.

Once you've selected a course, you'll be introduced to Accolade's copy-protection scheme. The disks aren't protected, but to continue you must match a hole displayed on the screen with one of the 54 illustrated on the Jack Nicklaus Course Sheet. It sounds easy, but the sheet is printed in black ink on maroon paper to resist reproduction. It also resists your ability to read it.

Jack Nicklaus' Greatest 18 delivers a clever mix of gameplay options. You can define your own players or select from nine golfers of varying ability, included on disk. You can select up to three to compete with you, either in stroke play, where the low total score wins, or in the Skins game, where each hole is played for high stakes.

The game varies the degree of difficulty, based on beginner and expert skill levels. Tees are set at three different distances, and you can choose to play as a man or a woman (the men hit the ball farther). If you're new to computer golf simulations, the driving range and practice green are great places to master your technique.

Take a Swing

Move the ball at the top of the screen to indicate the direction of your shot. A

power bar measures and times each stroke. Press the space bar to start your backswing. Press it again to start the downswing, and again to strike the ball. A color band rises and falls in the power bar, showing the strength of your swing and the exact moment that you strike the ball. You can deliberately, or mistakenly, make the ball move right or left by hitting the ball too early or late.

The graphics in *Jack Nicklaus' Greatest 18* are outstanding, especially in the 16-color EGA mode. From the shading used to display terrain to the detailed top view, this game faithfully represents each hole's hazards, topography, and beauty. The main display shows the hole you're playing, the power bar, wind direction and intensity gauges, the club selected, and direction to the pin. It also tracks each golfer, number of the hole, stroke count, score, and distance to the pin. The layout is clean, attractive, and easy to use.

The Right Touch

Accolade and Jack Nicklaus Productions are at the top of their game in accurately portraying the golf swing and flight of the ball. The speed at which the color band moves in the power bar varies from club to club, with the higher-numbered irons moving much slower than the woods and lower-numbered irons. Just as in real golf, it's easier to hit the ball straight for the correct distance when you're using the high irons.

FAST FACTS

Title:	*Jack Nicklaus' Greatest 18 Holes of Major Championship Golf*
Category:	Golf simulation
Features:	One to four people play at a variety of skill and difficulty levels
Requirements:	IBM, Tandy, or compatible PC with 384K RAM; EGA, CGA, Hercules MGA, or Tandy 16-color
Publisher:	Accolade 550 S. Winchester Blvd. Suite 200 San Jose, CA 95128
Price:	$49.95

With the different clubs, the trajectory of the ball is amazingly realistic. You'll find yourself hitting a low line drive under a tree with a 2 iron or landing a high wedge shot next to the pin on a well-protected green. While the wind has little effect at the beginning level, expert-level players will have to take into account the wind's direction and intensity.

Jack Nicklaus' Greatest 18 is less than topflight in the sand traps and on the putting greens. If you hit the ball into a sand trap, the computer automatically selects the sand wedge. There's no way to override the selection. While this is appropriate in a green-side bunker, it's ridiculous when you're in a fairway trap, 250 yards from the pin. I'm sure Jack would agree.

Power Putting

You'll also find some problems with the way this program handles putting. With the directional indicator far above the hole display, it's easy to find the line on long putts. In fact, I sank a couple of 30- to 40-foot putts each round, something I can only wish for on a real course. Putting the ball uses the same three movements as hitting an iron or wood, and putts of under 4 feet are hard to miss. But when you're hitting a 4- to 6-foot putt, you need lightning-fast reflexes to tap the ball the proper distance and direction. I missed more of these putts than I did the 7- to 12-foot variety.

There's also little if any difference between putting at the beginner level and putting at the expert level. In other simulations, the color band in the power bar disappears at the eight-foot mark, providing a more realistic feel to putting at the expert level.

You may also find the game's speed to be a problem, depending on your computer's processor. The game is much too slow on a 4.77-megahertz XT with EGA graphics. It took me two hours to complete a single-player game, with most of that time spent waiting for the screen to redraw after each shot. Playing in a foursome would be an all-day affair, as frustrating as a Saturday afternoon round on a crowded public golf course. Fortunately, owners of faster computers won't have to contend with the slow play.

Using innovative options like the Skins game and computer-generated opponents, *Jack Nicklaus' Greatest 18 Holes of Major Championship Golf* delivers a refreshing approach to golf simulations. While its outstanding graphics and realistic portrayal of the golf shot are partially offset by shortcomings in the putting game, this simulation is sure to grab your attention and provide many hours of challenging excitement. If you own one of the faster computers—one with a turbo-88, 286, or 386 processor—you'll have a chance to relax and tell tall tales at the 19th hole. If you don't, the clubhouse may be closed by the time you get there.

Star Saga: One—Beyond the Boundary

James V. Trunzo

A sprawling space opera, *Star Saga: One* is designed to shatter all computer role-playing game stereotypes. It requires a minimum of 60 hours to complete, but you'll swear it takes only 6—that's how engrossing it is.

The premise behind *Star Saga* is typical SF stuff. Eight hundred years in the future, an enforced border called the Boundary encompasses the Nine Worlds. The Boundary was built after the devastating Space Plague, brought to Earth by a space explorer, killed half the population of the known worlds. Now the Space Patrol guards the Boundary, prohibiting anyone or anything from entering the Nine Worlds. If you wish to leave, you may—but you can never return. *Star Saga: One* casts you and up to five more players in the roles of some exceptionally well-defined characters who choose to leave.

Juggling the Books

If this theme sounds interesting but somewhat standard, rest assured that a resemblance to anything you've seen before ends here. *Star Saga: One* uses your computer as a nongraphic bookkeeper/game master; the game centers around a set of 13 Entry Booklets and 6 Character Booklets. ▷

Each Character Booklet contains biographical information and story background on your chosen persona. It also spells out your specific mission and may even hint at a subplot that contributes to the suspense and the challenge of *Star Saga: One*. In addition, the Character Booklet summarizes the basic game rules and plots your first turn for you. Actually, since it serves as a form of tutorial, your first five turns are plotted; this familiarizes you with the program's protocol and integrates you with your story line.

The Entry Booklets make up the heart of *Star Saga: One*. Each booklet includes at least 70 numbered entries that provide you with the information you need to complete your mission. *Star Saga: One* includes more than 580 pages of text and 900 entries, but don't let that daunt you—you don't have to read all the entries in each book because many of the entries pertain to other characters.

Star Saga: One succeeds, in fact, *because* of the excellently written booklets. All the elements of exciting fiction and exhilarating role-playing are here. Combat, exploration, puzzles, intrigue, and trading become integral parts of the various story lines and your decision-making process.

Intersteller Wheelerdealer

The program manages the game smoothly and unobtrusively. It responds to all navigation and action plots, instructs players on what to do and how to do it, and directs players to text entries. It moderates all transactions between players and the intergalactic marketplaces, sets up meetings between participating players in multiplayer adventures, and conducts all hand-to-hand and ship-to-ship combat.

As many as six can play Star Saga: One.

Combat plays an important role in the game, but it isn't the primary focus. While you can increase your offensive and defensive options through training and purchases, the program uses its own matrix when combat occurs (always selecting your best offense and defense), and then it reports the results and directs you to a text entry. You don't get to choose tactical options; and while that doesn't detract from the game, it may bother hard-core war gamers.

Besides manipulating combat situations, the program tracks your and your ship's status, including your position, cargo, and weapon skills. The program also maintains a log of previous moves. The number of previous moves the program retains is limited, however, so you must also keep a written log. The bulk of information presented requires good note-taking skills—young or immature players may become frustrated by this aspect of the game.

The More the Merrier

You can play *Star Saga: One* by yourself, but you will miss out on the social activity that comes with group play; the game encourages player interaction. As many as six players, each with an individual goal, travel the same areas of space but don't directly compete. Players who take their roles seriously and explore their character's personality reap the most reward from this kind of social play.

If you do choose to play solo, you lose none of the enjoyment of the adventure. You can play when and as long as you want, and you can take the role of a different character each time you play. Of course, you can also play different roles in a multiplayer adventure, but since you have already learned about the other characters, the game's replay value is diminished.

Star Saga: One rockets ahead of other science fiction/fantasy role-playing programs because of its diversity, sophistication and scope. The amount of decision making it demands of players enhances the compelling plots and subplots. No matter whether you play solo or in a group, you'll find yourself completely taken in.

FAST FACTS

Title:	*Star Saga: One—Beyond the Boundary*
Category:	Role-playing science-fiction game
Features:	Individual or group play (as many as six players); extensive background material (580 pages in 19 booklets)
Requirements:	IBM, Tandy, or compatible PC; 256K; DOS 2.0 or higher
Publisher:	MasterPlay Publishing 8417 Sun State St. Tampa, FL 33634
Price:	$79.95

Battlehawks 1942

Ervin Bobo

Speaking as someone who has seen his share of computer flight simulators, I'll say it up front: *Battlehawks 1942* may be the best combat flight simulator ever produced for any computer.

Fly for the U.S. or Japan in Battlehawks 1942.

This is especially surprising since *Battlehawks* comes from the company that produced the lightweight *Maniac Mansion* and *Zak McKracken*. This time Lucasfilm has developed a program that is sure to be an instant classic. So what makes this one so good?

First, the battle scenarios are based on the actual battles of the Coral Sea, Midway, the Eastern Solomons, and the Santa Cruz Islands. (Each of these battles occurred in 1942, which explains why the year is part of the title.) Second, the graphics, particularly the

burning and exploding aircraft, are as good as any you've ever seen on an EGA monitor and aren't bad on a CGA.

Squadron Flying

You'll have to get used to flying as part of a squadron; no more *lone survivor* scenarios typical of other simulators. Other aircraft, both friend and foe, dart and weave through your airspace as they try to complete their missions.

Battlehawks allows you to fly for either Japan or the U.S. Since neither country decisively won any of the four historic battles, you won't have to worry about choosing the losing side. Either side can win, depending upon how well you fly your airplane. You can fly an F4F fighter to defend the carrier *Lexington*, which sank during the Battle of the Coral Sea. Or, as a Japanese torpedo bomber pilot, you can fly against the *Lexington*.

Being drawn so completely into the game, I felt a new kind of intensity, similar to the experience of a real life-and-death struggle. At the end of a session, I frequently found my neck and shoulders aching from tension. While this may say more about me than the game, it's a measure of involvement that I've never felt before.

On the American side, the mission you select puts you in an F4F Wildcat fighter, an SBD Dauntless dive bomber, or a TBF Avenger torpedo bomber. For the Japanese, your craft might be a Zero fighter, a Kate torpedo bomber, or a Val dive bomber. Although the tactical use of each plane differs, the control panels do not, and the flight characteristics hardly change at all.

Stall Factor

If you raise the nose of your craft more than about five degrees above the horizon, a message bar below the control panel informs you that you're about to stall. Shortly thereafter, the nose of your craft pitches down, plunging you toward the sea. The message bar then tells you the stall has been recovered. If you don't pitch down to regain speed and avert the stall, the heavy motor in the nose of the craft will cause it to happen for you. This is frustrating.

You cause this effect by raising the nose. If you wish to climb steeply, you must first dive to build up airspeed. Rather than gripe about it, those of us accustomed to standing jet aircraft on their tails might concentrate on other things. We might learn to appreciate the authenticity built into *Battlehawks* and to appreciate the men who flew these airplanes into combat. Once you've learned to live with the stalling, *Battlehawks* becomes an absolute joy and a challenge of the first order. ▷

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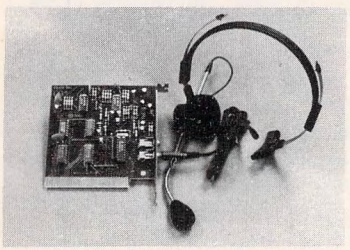

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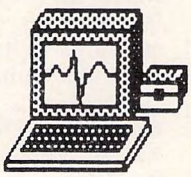

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From the opening menus, you can choose Practice and fly a fighter against eight of the enemy, who can't shoot back. In this mode, you fly with unlimited fuel and ammo, but the simulator insists on tactical accuracy. Study the manual and learn about deflection shooting. Close the distance between you and your target—machine guns have considerably less range than heat-seeking missiles. You should also learn to gain and use altitude. With height on your side, you can control the battle; without it, you'll flail around like a headless chicken.

FAST FACTS

Title:	*Battlehawks 1942*
Category:	Combat flight simulator
Features:	Fly U.S. or Japanese aircraft in four 1942 naval air battles
Requirements:	IBM, Tandy, or compatible PC with at least 384K RAM. Supports CGA, EGA, VGA, and Tandy 16-color; both 5¼- and 3½-inch disks included.
Publisher:	Lucasfilm Games P.O. Box 10307 San Rafael, CA 94912
Price:	$49.95

When you've mastered the art of shooting planes out of the sky, you're ready for Active Duty missions. Here you'll choose one of the four battles and one of four missions within that battle. You won't need to bother with takeoffs and landings, since all missions begin with you in the middle of the air and end when you fly out of the battle zone.

Many of the missions involve formation flying. While this can be a great help, don't rely on your buddies to get the job done. A squadron score is given with your personal score at the end of each mission, and if you want to earn medals and points, you'll have to be alert at all times.

Akagi Attack

In the Battle of Midway, you'll find a good example of how your squadron can help you. Here, you follow Lieutenant Dick Best as he delivers the first bomb on the carrier *Akagi*. Best flew in the real battle and also served as the technical consultant for *Battlehawks*. Stay lined up behind his craft and dive when he dives. Then it's a matter of ignoring the flak and not releasing your bomb until you're below 2000 feet. Now retract your speed brakes, haul back on the stick, and move out.

If you don't want to wait until the end of the mission to find out whether you've made a hit, you can engage the gun camera as you start your run. After you have pulled out of your dive and have made it away safely, select Replay. You'll have a cockpit view of your own aircraft ahead of you. You can use your joystick or mouse to slue the viewing angle to see things from a different perspective.

Other views include the standard left, right, rear, and down. If you fly the Dauntless dive bomber, you'll have a backward-flying passenger. Then when you select the rear view, you'll find that your controller (joystick, mouse, or keyboard) controls the angle of the rear gun.

Never in a Simulation

As you approach the *Akagi*, Best gets there before you and hits the target. A column of black smoke, complete with fiery red explosions, rises from the deck. It's one of the best effects I've seen in any simulator. If successful in air combat, you'll see the enemy trailing black puffs of smoke and flames. Certain shots cause an enemy plane to explode, and you may even find yourself flying through the debris. You'll also fly through black puffs of flak. These are the kind of things we've all seen in war movies, but never in a computer simulation.

I wish I could be as ecstatic about the sound. It's as good as anything else you've heard on a PC and better than most. The fault lies in the original design of the IBM PC, not in the design of *Battlehawks*. The gunfire is good, some explosions are excellent, and the rattle of gunfire and shrapnel against the skin of your craft is an unexpected surprise.

The documentation for *Battlehawks 1942* is must reading. In addition to the Game Play section, there's one called Historical Overview, placing each of the four sea battles and the weapons available to fight them in the proper context. Other sections, Flight Fundamentals and Aerial Tactics, will help you understand how to stay alive in combat. You'll also find specifications of the Japanese and American ships and planes; a bibliography for those who want to read more about the subject; and colorful maps detailing each of the battles.

In creating *Battlehawks 1942*, the designers at Lucasfilm used what they call high-resolution, digitally rendered images. Planes and ships can scale through 1500 magnifications. You see a distant airborne dot grow to become a Zero that flashes across your windscreen. And when you're dive-bombing, a ship grows in your sights with no apparent breaks for redrawing the screen.

I measure any software by how well it accomplishes its goals, though I frequently have to guess the goal. In this case the general manager of Lucasfilm games has stated his goal very clearly: "One of our key design goals was to come as close as possible to the visual intensity of World War II newsreel footage."

Lucasfilm has come very close to this lofty goal. *Battlehawks 1942* is one of the best flight simulators I've ever seen.

Byte Size Software

Glenda McClure

You can't buy an accounting system for under $30. Or can you? How about a stock manager or home-inventory program for even less?

If you're willing to forgo some of the features found in high-end products, *Stock Portfolio*, *General Ledger*, and *Home Inventory* from Byte Size offer the software basics for under $30 each.

These three programs are similar in two ways. First, all three have a menu-driven interface—once you're familiar with one, the others will be easy to learn. Second, all three come with a short list of instructions: a four- to six-page pamphlet with descriptions of the basic commands. You'll find additional instructions on the disk stored as an ASCII file, which you can print if you need a hardcopy.

Stock Portfolio

This program allows you to set up a stock portfolio and perform the basic operations necessary to keep it current. After you've provided the name of each of your stocks, the date of purchase, and the price per share, you maintain the program by entering the daily changes in the stocks' prices. Using these price changes, *Stock Portfolio* adjusts each stock's profit/loss as well as the net profit/loss of the entire portfolio.

If you buy another stock, choose Add a Stock; then give the stock's name and trading information. Selling a stock is just as easy: Highlight the stock to sell, enter the number of shares, and the program takes care of the rest.

You can also enter your stock dividends, which will be posted automatically in the sales journal. When a stock splits, enter the split ratio, such as 2 : 1 or 3 : 1, and the program automatically enters the new number of shares and its new price.

Stock Portfolio keeps a separate journal of stock sales and dividends that can be very useful at tax time. After a year of hectic trading (or a year of only a handful of trades), select Year-End Update to incorporate the sales-journal information back into the portfolio. This updates the profit/loss of all the stocks in the portfolio. This option also wipes out the sales journal, so it's a good idea to have a hardcopy of the journal before performing the year-end updates.

Stock Portfolio does an adequate job of maintaining a portfolio. On the positive side, the stock deficits appear in red if you're using a color monitor, and the pop-up windows make the commands easy to use. On the other hand, the program's Sell option is flawed: It lets you sell more shares than you actually own. This gives you a negative number of shares in your portfolio and a negative value for that stock. While a short sale is a valid Wall Street maneuver, the program doesn't warn you that selling more shares than you have will result in a short sale. The program should ask if you really want to sell more than you currently own.

You'll also find that it's awkward to back up the disk and print a hardcopy before running the year-end update. An option to print the sales journal before performing the year-end housecleaning would assure that you had a backup copy. At present, you're forced to back up the entire disk manually.

While you won't find any bells and whistles with *Stock Portfolio*, you will find most of the features necessary to track the average stock portfolio. Even though the program's Sell option doesn't check for short sales, the program will fill the needs of most investors.

General Ledger

This package provides small businesses with the capability to perform double-entry bookkeeping. *General Ledger* consists of two main screens: Chart of Accounts and General Journal. The first provides a list of all accounts, their type, and their balance. The second shows the bookkeeping entries in all of the accounts.

The Chart of Accounts screen allows you to add, edit, replicate, and delete accounts. You can also view a balance sheet and income statement to see how the accounts are affecting the profitability of your company. In addition, you can select Detail for any account for a closer scrutiny of the account's activity.

The General Journal screen is where you add, edit, replicate, and delete journal entries as well as view balance sheets and income statements. A Year-End Update option deletes the journal and updates all of the ledger accounts. Since this is a double-entry accounting system, each journal entry lists an account showing where the money in question came from as well as the account to which it's going. Thus, all account balances in a journal entry must total 0 or the program won't permit you to proceed.

I found this program to be easy to use, but I'd recommend it only for people who are thoroughly familiar with double-entry bookkeeping. While the manual's appendix cites many accounting books as references, the documentation could have better explained the program's method of bookkeeping.

Home Inventory

This Byte Size package helps homeowners keep a current record of their possessions and important papers. This

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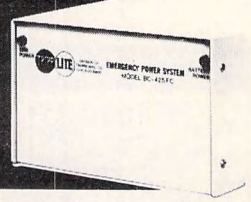

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list can be extremely useful for insurance purposes. *Home Inventory* divides your belongings into three categories: Home Inventory (possessions), Credit Cards, and Important Papers.

You can add items to each of these categories by highlighting the category and then providing a description of the new item. You can also display and edit any item should you wish to change the information in its description. The Home Inventory category provides the option of either a limited display (item description, quantity, location, price) or an extended display (the limited-display items plus serial number, warranty information, and comments).

Searching and sorting the information in the categories is very simple and straightforward: Select the category and the field to search or sort, enter a search string, and that's it. The program tells you whether or not it has found the search text and how many items it has located. You can then page through the entries to find the one you're interested in. To make it easy to keep track of items at more than one location, *Home Inventory* supports multiple files on the same disk.

The only problem I had with this program occurred when I was editing an item description. When you've finished editing an entry, the program doesn't write over the old data with the new. Instead, it adds a new entry to the list, leaving the original item intact. Whenever you edit any entry, you have to delete the old entry afterwards. This is clumsy and should be corrected.

All in all, *Home Inventory* allows you to maintain a basic inventory of your most valuable possessions, permitting you to make changes easily.

If you don't need to use sophisticated and expensive packages like *Lotus* or *dBase*, Byte Size software may be just for you. Buy it if you want a no-frills program that performs one particular task in a simple, direct manner. On the other hand, if you're looking for an expandable program or one with additional features, look elsewhere—but be prepared to pay a lot more.

FAST FACTS

Title:	Byte Size Software
Category:	Personal productivity software for home or small business
Features:	Series of 16 titles that include *Word Processor, Mail & Phone List, Modem Software, Recipe Finder,* and *DOS Shell*
Requirements:	IBM PC or compatible, 256K; CGA and mouse optional
Publisher:	Publishing International 333 W. El Camino Real Suite 222 Sunnyvale, CA 95087
Price:	*General Ledger* $24.95 for 5¼-inch disk $27.95 for 3½-inch disk *Home Inventory* or *Stock Portfolio* $21.95 for 5¼-inch disk $24.95 for 3½-inch disk

Pete Rose Pennant Fever

Mickey McLean

In the early days, computer baseball was simple: You tried to hit the ball with the bat and hoped for the best.

With Gamestar's *Pete Rose Pennant Fever*, things are more interesting. You need to excel as team owner, general manager, scout, field manager, trainer, and player to have a successful team.

Here's the scenario: The major leagues have expanded, and you've been granted a franchise in either Eugene or Menlo Park (the home of Gamestar). You also can move the team to your own hometown or any other city of your choice—without the approval of the baseball commissioner or other owners! Two players can operate two expansion teams simultaneously, but the only way the two of you can play head-to-head is in an exhibition game or in the playoffs. Otherwise, you compete against a computer league full of familiar big-league names.

No Steinbrenner Budget

Once your team has found a home, you acquire a roster of players with varying abilities (both expansion teams contain players with identical talent), including Pete Rose himself. The league has also granted you $1 million to draft rookies or purchase free agents. In these days of inflated salaries, $1 million doesn't go very far. You can spend your dollars now and take what you can get or wait until next season.

Each season's performance on the field determines how much your franchise earns, and you have ten seasons (there are about five games to a season) to turn your expansion team into a consistent winner and a World Series champion.

While assuming the role of team owner, general manager, or scout, you must keep an eye on the free-agent and rookie markets—especially in the two-player game, since your opponent has access to the same pool of players.

Rookies are less expensive than veteran players, but you might find a young player who has the talent to become the next Pete Rose. As a rookie's career moves along, his abilities improve. Before the beginning of each game, you'll receive a report on which players have improved.

You are limited to 24 players on your active roster (just like the big leagues) and, instead of having a minor league system, you can keep up to 20 additional players on a reserves list.

Hey, Skipper

As field manager, you are responsible for deciding on a starting lineup. You determine who plays what position and the team's batting order. First-time players should place Pete Rose in a defensive position that helps the team the most. Unlike those of the other eight men on the field, Rose's actions are controlled by the computer. Therefore, his defensive abilities exceed yours the first few times you play the game. Rose also has autonomy at the plate, swinging away at his own (the computer's) discretion.

To help you set the lineup, each player has been rated according to his abilities. His batting rating includes a number and a letter. The number tells whether he's a fly-ball, line-drive, or ground-ball hitter. The letter refers to his power-hitting ability. Players are also rated on their speed.

In setting up your lineup, then, a fast line-drive hitter would be the appropriate player with which to lead off, while a fly-ball power hitter would be your best cleanup batter because of his ability to jack the ball out of the park.

FAST FACTS

Title:	*Pete Rose Pennant Fever*
Category:	Baseball strategy and action game
Features:	General manager, manager, and player roles; joystick or keyboard interface
Requirements:	IBM PC, XT, AT, PS/2, or Tandy 1000 EX, SX, TX, HX, 3000; 512K; CGA, EGA, Tandy 16-color; 5¼- or 3½-inch disk drive
Publisher:	Gamestar Distributed by Mediagenic P.O. Box 3048 Menlo Park, CA 94025-3048
Price:	$44.95

Here's the Pitch

Many big-league managers lose their jobs by mismanaging a pitching staff. Gamestar has added this variable to *Pennant Fever*. Over the course of the game, pitchers become tired. A fatigue rating shows you how many games a pitcher needs to rest before regaining his full strength. You need to be careful about selecting a pitcher to start and about how long you leave him in. You could end up with a staff of worn-out pitchers before the end of the season.

Pitchers also receive ability ratings, which help you find the right guy to bring in with the bases loaded and nobody out. In addition to the pitcher's fatigue rating and an indication of whether he is a lefty or a righty, the game provides a speed rating telling you how hard he throws the ball and a control rating that indicates his tendency to give up walks. The pitcher's stamina rating shows how many innings he can normally throw before tiring. If there's a 5 in his stamina column, you'd better have someone ready to come in for relief pitching duties in the sixth inning.

Each pitcher also has two specialty pitches, which include fastballs, heaters, change-ups, curve balls, screwballs, sinkers, and knuckle balls.

Call the Team Doctor

Physical problems can also arise during a season, placing you in the role of team trainer. In addition to pitchers getting worn out, any player can sustain an injury, but you're not required to tape any ankles. Before each game, an injury report appears on the screen to let you know who's out. A player from the reserves list can be brought up to the active roster to take his place. Once the injured player regains his health, he can be put on the active roster or on your reserves list. You can also lose players each year to retirement.

Play Ball!

Now that you've set up your roster, made out your lineup card, and selected your starting pitcher, it's time to take the field. Many baseball games have excellent strategic options but poor playability, and vice versa. *Pennant Fever* not only gives you the opportunity to run the team from the front office, but also provides you with excellent action on the field.

The initial onscreen perspective is from behind the batter. Once the ball hits the bat, the screen switches to a defensive view. Unless the ball is hit to Rose's position, you must position your player with the joystick or the keyboard and field the ball. You can then throw to the base of your choice or let the computer automatically throw to the most appropriate base. The latter option can save you valuable time in trying to head off runners.

When the ball is being thrown, a power bar appears at the bottom of the screen. Ideally, you want to throw the ball at 100-percent strength, but if you pull back your arm (by pressing the action button) too far or not far enough, you lose something on your throw. The game gives you the option to turn the power bar off and make 100-percent throws each time, but this also deactivates the automatic base selection, which forces you to select the appropriate base on each throw.

Your pitcher can select a slow pitch, a fastball, or one of his two specialty pitches. The position of the joystick (or the appropriate keypresses) gives you eight possible pitch combinations. You can also choose a pitchout if a base runner has taken a big lead and is threatening to steal.

Once the pitch has been selected, you must press the action button and position the joystick to send the pitch inside, outside, high, or low. Moving the joystick to the upper left sends the pitch in high and tight to a right-handed batter. But be careful. Cutting it too close may result in a hit batter, which rewards your opponent with a free pass to first base. Should you accidentally or deliberately hit a batter, he will hit the dirt—but so far no one has charged the pitcher's mound to fight. Gamestar apparently did not want to make the game *that* realistic.

While at the plate, you can choose whether to hit for power or just for contact, or you can choose to lay down a bunt. You can also choose to have the computer control your players' swings. Other offensive options include stolen bases and the old hit-and-run play. You also control the lead runner on base.

Hit a Dinger, Gimme Five

Pennant Fever has many of the thrills of real major league games. After home runs, players are greeted at home plate with high fives. And the crowd goes wild when the game gets exciting. The only sound effect the game could do without is the loud opening theme. It has annoyed more than one person in our office.

Pennant Fever is designed to take advantage of an EGA system, but the game also supports CGA and Tandy 16-color. With CGA, the game plays more slowly, but much of the action and features are there.

One quirk in the game's strategy is the ability to take a player out of the game, especially a pitcher, and later substitute him. This goes against baseball rules. Another feature that needs to be changed is that the batter's name and ratings should appear on the screen throughout his time at bat. It would be helpful to be reminded of

who you are pitching against and what he's capable of doing at the plate.

Pete Rose Pennant Fever is an all-in-one baseball simulation. It allows you to live out practically any baseball fantasy. In fact, the only thing the game doesn't let you do is open beer-and-hot-dogs concessions.

Star Trek: First Contact and *Star Trek: The Rebel Universe*

Ed Ferrell

Captain's log: *Stardate 4122.1. This is James T. Kirk of the starship Enterprise. Recent tricorder readings indicate a disturbance emanating from the Simon and Schuster system, and it's heading straight for us. Apparently, two new computer games require some exploration. There goes our R and R on Delios!*

The two new Star Trek missions are *First Contact* and *Rebel Universe*. They're of the same high quality as *The Kobayashi Alternative*, the first in the series. One mission holds the promise of first contact with an Alien race; the other challenges you with the very survival of the Federation and, possibly, the Universe.

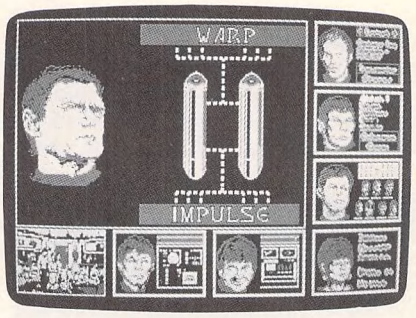
You take the captain's chair and prepare to lead your crew *where no man has gone before*. . . . But this is no ordinary ship and, certainly, no ordinary crew. It's the starship Enterprise, the finest in the fleet, with a familiar and experienced crew: Uhura, communications; Sulu, navigation; Chekov, weapons systems; McCoy, chief medical officer; and, of course, First Officer Spock. With either game, you'll need to communicate quickly with the officer appropriate for the job (don't ask McCoy to open a hailing frequency, or Uhura to give a medical opinion).

Open Hailing Frequencies

First Contact's screens and interfaces are much the same as those used in *The Kobayashi Alternative*. At the top of the screen, you'll find the main text window, where you'll see your current location within the ship, and where any commands (like Look and Examine) will be answered. You can access the ship's computer data here as well. As you play and confront new situations, you'll see new people enter the game (many with a separate color graphic displayed on the main screen).

To speak to a crew member who is there with you, simply type your question into the Kirk window; a response will appear in a separate pop-up window. Be sure to study the ship's computer data to avoid any protocol errors when you're dealing with Aliens. You certainly don't want any intergalactic misunderstandings. To direct the actions of crew members in other locations, you can use the ship's intercom or your communicator.

First Contact begins with secret Federation orders. Your mission is to pick up a group of Federation officials and escort them safely to the coronation of Prince Clavius on planet Gothica. Once there, seek out the source of a remarkably strong radio pulse coming from the very edge of the Universe. It's possible that this is a beacon from an unknown alien race. And it's quite probable that the Klingons are already aware of it, so keep your guard up. It's also imperative that you make the first contact with the Aliens, especially if being second means coming in second to the Klingons.



Control the Enterprise in Rebel Universe.

The arrow keys are used to move yourself around, whether you're accompanying a landing party to the surface of a planet or just getting around the Enterprise. You should try to become as familiar as you can with the layout of this big ship. Using the turbolift, you can travel to several of the ship's decks—reaching the medical offices, captain's quarters, or engine room. The transporter is also available for ventures off the ship.

As you probably know from the television show, much of the action takes place on the bridge. It's from the bridge that you'll be able to access the ship's computers; have Uhura open hailing frequencies; and direct Chekov to raise the shields, lock on phasers, and fire. A military engagement should be your last resort. By all means, defend yourself, but remember that your mission is to make first contact with an alien race.

A successful mission depends less on brute military tactics than on your own detective skills and your thoughtful delegation of the tasks at hand. Having Spock scan frequently can turn up important clues, and you'll need to examine the computer banks for any helpful data. Use the Look and Examine features often to keep up with the constantly changing situation.

While escorting the Federation delegates to Gothica, you can interview them—diplomatically, of course—for information that may prove useful later. You can also use secrecy to confuse the Klingons about the real nature of your mission (this is an effective tactic).

FAST FACTS

Title:	*Star Trek: First Contact* and *Star Trek: The Rebel Universe*
Category:	Graphics adventure games
Features:	"Star Trek" characters and situations; sound effects and color graphics; over 4000 planets to explore
Requirements:	IBM, Tandy, or compatible PC; 256K; DOS 2.0 or higher; graphics adapter
Publisher:	Simon and Schuster Software One Gulf + Western Plaza New York, NY 10023
Price:	*First Contact*—$39.95 *Rebel Universe*—$49.95

You don't want the Klingon warships around as you take the Enterprise on her greatest mission.

Fire Photon Torpedoes

In Simon and Schuster's second Star Trek adventure, *Rebel Universe*, all the Federation starships that have entered the Sagittarius Arm have either disappeared or switched allegiance to the Klingon Empire. Your mission is to find out why—without getting blasted or co-opted like the others. Unlike *First Contact*, Simon and Schuster's *Rebel Universe* is a fast-paced, action-oriented game where combat with the enemy is inevitable and even Federation ships can be hostile. Part of winning *Rebel Universe* depends on how fast a wary captain can determine ships to be friend or foe—regardless of the flag they fly.

The *Rebel Universe* main screen is bordered by eight small windows, each representing a different crew member. Use Uhura when you want to communicate with Starfleet, or Scotty when you want to engage the warp drives. You select crew members the way you'd choose tools or colors in a paint program: You position the cursor over the person that represents the service you need and then hit Enter. Choose Scotty, for instance, and the large window in center screen displays the controls for the ship's engines. These are manipulated in the same point-and-shoot method. You can access the controls even faster with a joystick, which is good, because the faster you move, the better you'll play.

You'll need to plot a course to the Federation traitors. They're quite far away, so you'll have to leapfrog from one friendly (hopefully) star base to another. Call up navigation, and a 3-D star globe revolves on your screen in an exciting, animated graphic. Stop and start the rotation, and the screen shows you the planet's distance from your current position and its last known status (friendly or not).

After you've plotted your course, call up Scotty's window. Scotty's controls fill the center screen, and the navigation window becomes part of the palette again. Instruct Mr. Scott to engage the warp engines and you'll proceed on your way. As you move along, look out for planets that have the dilithium crystals needed to refuel the Enterprise.

As you leapfrog from system to system in search of the secret of the rebel universe, you'll engage the enemy often. To be successful, you'll need to be prepared and have quick reflexes. Using several different animated screens, you'll lock on your phasers and dogfight an attacking ship. Don't forget to check your power reserves and weapons settings. ▷

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Steady As She Goes

Both games come with lavish documentation, sure to please the most avid Star Trek fan. You'll find many color photos and screen shots throughout the handbooks, which are loaded with tips and interesting background material.

As I played these games, it struck me how appropriate it is to play them on a computer. With a tank simulation or flight simulator, the feeling of reality can come very close, especially with a joystick, but you don't really feel you're in a tank or airplane. Unless your computer desk is very different from mine, you won't be on the Enterprise with *First Contact* or *Rebel Universe*, either. Yet, with the Star Trek games, it somehow seems more real. After all, if you were on the Enterprise in the middle of a battle, you would probably be sitting at a terminal anyway.

Until another exciting mission, this is Kirk—out.

Turbo Prolog 2.0

James W. Maki

In 1981, Japan stunned the computer community by passing up LISP and selecting Prolog as the language for its fifth-generation computer project. At the time, LISP was the language of choice for artificial intelligence work in the U.S.; few programmers here had even *heard* of Prolog. Why did Japan place the fate of its monumental project in the hands of an upstart like Prolog?

Turbo Prolog 2.0 is Borland International's newest version of this fifth-generation language. Prolog, short for *Pro*gramming *log*ic, is billed as the natural language of artificial intelligence. The field of artificial intelligence includes such topics as expert systems, knowledge bases, language translation, and computer-aided manufacturing.

The terms *artificial intelligence, fifth-generation language, expert systems,* and *knowledge base* are often used interchangeably. While they are related, they do represent different objectives.

An expert system is a database designed to mimic the thought process of a person knowledgeable about a specific subject. Given a set of facts, an expert system will come to a conclusion based upon those facts as well as the rules formulated by the expert.

A knowledge base is similar to an expert system except that there's less dependence on rules and more reliance on facts. A program that diagnoses an illness from the symptoms is an expert system, while a program that lists the symptoms for a given illness is a knowledge base.

The term *fifth-generation language* refers to the fifth level of interaction between man and computer. Binary code is a first-generation language, while assembly language represents a second-generation language. In each case, a single command corresponds to a single machine instruction. Third-generation languages like Pascal, FORTRAN, and BASIC represent many machine-level operations in a single command.

A fourth-generation language is associated with a database language. Short English-like commands are used to create a database as well as add, delete, and modify entries to the database. While a database language often looks more like BASIC code than true English language syntax, it does reduce the complexity of creating and maintaining a database.

The goal of this progression is to find a method that allows a novice to create and query a computer system without knowing any special syntax. In other words, we're attempting to move to a natural language interface. This is the promise of Prolog but not yet the reality. Prolog still requires the programmer to create an English-language parser for a program. Until we reach our goal, we'll have to translate what we want into something the computer can understand.

How to Speak Prolog

Prolog is a declarative language. It differs from other languages in that it uses facts and rules to deduce answers to questions. A procedural language like BASIC requires the programmer to explicitly describe the steps necessary to solve a problem. This rigidity reduces the ability to pursue alternate paths to the answer.

For instance, given the following facts and goals, Prolog can easily solve the problem *Which computer should.Fred purchase?* (in Prolog terminology, the problem to be solved is called a *goal*).

Fact 1. Barney owns a LEMON computer.
Fact 2. The LEMON and ORANGE computers are compatible.
Fact 3. The LEMON computer costs $1,100.
Fact 4. The ORANGE computer costs $900.
Fact 5. The LEMON computer is a color computer.
Fact 6. The ORANGE computer is a color computer.

Goal 1. Fred wants to spend less than $1,000.
Goal 2. Fred wants a color system.
Goal 3. Fred wants a computer compatible with Barney's computer.

It's not difficult to translate between the predicate logic syntax of Prolog and English. The complete Prolog program follows:

```
/* Example Turbo Prolog Program to
   choose a computer system */

predicates
     has(symbol, symbol)
     same_as(symbol, symbol)
     computer_cost(symbol, integer)
     computer_is(symbol, symbol)
     should_buy(symbol, symbol)

clauses
     has(barney, lemon).

     same_as(lemon, orange).
     same_as(X,Y) if same_as(Y,X), !.

     computer_cost(lemon, 1100).
     computer_cost(orange, 900).

     computer_is(lemon, color).
     computer_is(orange, color).

     should_buy(fred, ComputerSystem) if
       computer_cost(ComputerSystem,
       Cost) AND
         Cost < 1000 AND
       computer_is(ComputerSystem,
       color) AND
       has(barney, ComputerSystem2)
       AND
       same_as(ComputerSystem,
       ComputerSystem2).
```

Running the program and entering *should_buy(fred, ComputerSystem)* at the goal prompt generates the answer:

```
ComputerSystem = orange
1 Solution
```

This indicates that the ORANGE computer satisfies all the requirements of the should_buy( ) predicate.

Prolog answers the query by starting at the top of the list and systemati-

cally searching the list of facts and rules. When a subgoal is satisfied, the system returns to the top of the list, searching for a match to the next subgoal. When a match is found, the system continues to look for matches until all possibilities are exhausted.

The example program shows the minimum requirements of a Prolog program: a predicates section and a clauses section. The predicates section describes the structure of rules and facts found in the clauses section. The predicate has(symbol, symbol) indicates that whenever the has( ) predicate appears as a rule or fact, it will contain two arguments (known as *domains*), both of which are symbols (similar to strings in Pascal or BASIC). The other *Turbo Prolog* domains are *char* (a single character), *integer* (−32,768 to +32,767), *real* (1e−307 to 1e+307), and *string* (anything between quotation marks). For most purposes, symbols and strings are treated the same by a Prolog program.

A fact indicates how two or more things are related, such as has(barney, lemon), which is freely translated as *barney has a lemon computer.* A rule states a fact which may or may not be true, depending on the truth of the statement(s) following the if symbol (if or :-). The statement before the if symbol is referred to as the *head* of the rule, while the statement(s) after it are the *tail.*

In Prolog, constants are written in lowercase (fred, barney, lemon, and orange), while variables (ComputerSystem, Cost) begin with an uppercase letter. Variables in Prolog are not the same as variables in other procedural languages. You can't store a value in a variable. The variable takes on values during the program by a process called *binding,* but the program unbinds the variables just as fast. They're not a permanent storage area.

In the example, Cost and ComputerSystem are bound to $900 and orange for the correct answer. But during the course of the search, Cost is bound to $1,100 and ComputerSystem is bound to lemon. When the match for all of the subgoals fails with this binding, the program backtracks, unbinds the variables, then continues the search for a correct answer (or answers) with variables bound to other values.

The other symbol used in the example is the *cut,* signified by an exclamation point (!). The cut causes the program to cease looking for alternative answers to the rule in question. Without the cut, the program goes into an endless loop, printing *ComputerSystem = orange* over and over. This occurs because of the backtracking to find alternate solutions to the same_as( ) predicate.

Borland's Prolog

Turbo Prolog comes on four 5¼-inch disks. It will run on a two–floppy drive system or a hard drive system with at least 384K of main memory. I had no problems running the program on both a two 3½-inch drive system (720K disk capacity) and a hard drive–based system.

Borland has provided batch files for automatic installation for both floppy and hard disk systems, with user prompts for trouble-free installation. The hard disk installation takes less than 15 minutes, while the floppy installation takes much longer (you'll have to format and copy nine floppy disks, including backups).

With the proliferation of high-capacity removable disk drives (720K, 1.44MB, and 1.2MB), I would like to see more information in the setup section on how to utilize the increased disk-storage capacity. The two–floppy drive installation assumes you have 360K-capacity disk drives.

Turbo Prolog supports calls to procedures written in other languages. Borland guarantees that their *Prolog* will work with *Turbo C* version 1.*x*, but the manual states that *Turbo Prolog* should work with any language that utilizes standard .OBJ files. *Turbo Prolog* includes support for EMS (extended memory) and B+ trees for use with ex-

HFS-III vs. Quicken

What's the best home finance program?

	HFS-III	Quicken
Bank-account transfers (e.g., savings to checking)	Simple, one-step operation.	Can't do it. Must enter separate "expense" and "income" transactions.
Credit accounts	Up to 100 special accounts for credit cards and bill payments.	No special credit accounts.
Check printing	Full-screen editor accommodates any business-size check form.	Must buy Quicken's pre-printed checks.
Check reconciliation	Enter checks by number or range of numbers.	Must mark each check.
Speed	100% fast assembly language.	High level compiled language.
Account names	Up to 30 characters.	Only 8 characters.
Password	Yes.	No.
Screensaver	Yes.	No.
User-defined keys	Yes.	No.
Parent accounts	Yes.	No.
Reserve accounts	Yes.	No.

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FAST FACTS

Title:	*Turbo Prolog* 2.0
Category:	Programming language
Features:	Interactive programming environment; compiler for creating stand-alone applications; no license fees required for completed programs; useful example programs
Requirements:	IBM, Tandy, or compatible PC; 384K; DOS 2.0 or higher; two disk drives
Publisher:	Borland International 1800 Green Hill Rd. Scotts Valley, CA 95066
Price:	$149.95

ternal databases. This lets you create databases that are larger than your computer's memory. The Borland Graphics Interface (BGI) supports numerous monitors and graphics cards, including Hercules, CGA, EGA, and VGA.

The examples included with *Turbo Prolog* contain a wealth of useful information. They include GEOBASE, a knowledge base of geological information about the United States that utilizes a natural language interface; GENI, a classification expert system; and several smaller examples, including a Tower of Hanoi simulation.

Up and Running

If you've used *Turbo Pascal, Turbo C,* or *Turbo Basic,* the main program screen will be familiar. The command structure and pull-down menus are similar in all *Turbo* languages. The *Prolog* screen is made up of four windows, as well as a menu bar containing the menu items Files, Edit, Run, Compile, Options, and Setup. Commands are implemented by the main menu, command keys, or hot keys (function key or Alt and Ctrl key combinations).

The main window is the Edit window, which is used to enter and modify Prolog programs. *Turbo Prolog* uses a subset of *WordStar* commands for cursor movement and block manipulation. The second window, the Dialog window, is used to enter the goals that will be evaluated by the *Prolog* system. The other windows are for information. The first is a Message window, which displays the commands being processed or messages from the system. The last window is used for the trace function to indicate the flow of the program. The windows can be resized and moved to fit your individual needs. The bottom line lists some of the current hot keys. The list of hot keys will change depending on the current window and state of the program.

Turbo Prolog is designed to be an interactive programming environment. The programmer can enter the program and instantly test it without leaving the *Turbo Prolog* environment.

You can create stand-alone programs with the compiler, which is included in the package. The only requirements regarding the selling of your programs are spelled out in the Borland No-Nonsense License Statement (located in the front of the manual). They boil down to not selling a competitive Prolog Interpreter. In addition, you're given the right to edit, modify, and incorporate the example programs contained on the *Turbo Prolog* disk into your own programs. This could save you months of development time for your own Prolog programs. Borland has always given good value for their products and a fair and honest arrangement for distributing programs written with their programming languages. *Turbo Prolog* is no exception.

Your Guides

The *Turbo Prolog* package includes two manuals. The first, the *User's Guide,* is a tutorial for *Turbo Prolog.* You'll find many examples and explanations designed to help you learn the language. I recommend you first read through several of the initial chapters to get a feel for the capabilities of the language. Then return and study the examples, modify them, and watch the results. This is definitely a language where practice is necessary. Nonprogrammers may actually benefit from their lack of knowledge of another language. Prolog is that different!

The second manual, *Reference Guide,* lists all of the commands of *Turbo Prolog.* With each command is an example and an explanation of its use. Thumbing through the reference manual will convince even the most skeptical programmer that *Turbo Prolog* can handle almost any problem. From windows to stunning graphics, *Turbo Prolog* has it all.

Postlog

I spent a portion of this review explaining what Prolog is rather than simply describing *Turbo Prolog.* Prolog is such a departure from other programming languages that it was important to give you an idea of the types of problems Prolog can solve—before describing how *Turbo Prolog* can help solve those problems.

As with all Borland products, *Turbo Prolog* operates efficiently and effectively. If you want to see just how popular *Turbo Prolog* is, check out the many after-market books available for it. If you're interested in the field of artificial intelligence, expert systems, or knowledge bases, or if you just like to dabble with new programming languages, you won't go wrong with *Turbo Prolog.*

Life & Death

David English

The life-and-death business has two sides—one serious and one comic. On the cover of the *Life & Death* box, you see four surgeons in masks, just as the patient would see them from an operating table. That's on the front side of the box.

Behind the scenes, it's a different story. On the back of the box, a surgeon's hands reach down to pick up a bloody heart that has accidentally fallen on the floor.

That's how it goes in the noble profession of surgery—sometimes things go as planned; other times nothing seems to go right.

Is There a Doctor in the House?

In *Life & Death* from The Software Toolworks, you can forget about trying to rack up millions of points or achieving a lofty rank. Like a real doctor, you're simply trying to keep your patients alive—one at a time.

You're a first-year resident, and it's

your first day on the job. Toolworks General Hospital has assigned you to work under Dr. Lindstrom in the Department of Abdominal Surgery. Nurse Pierce greets you at the main desk with the sign-in clipboard and says, "You have a patient in room 4. That's the last door on your right."

You sign in and then look around. You see a door behind the desk labeled STAFF and an intercom on the wall. Down the hall you see three doors on each side: The first on the left is marked OR (Operating Room); the first on the right is marked Class. You can't quite make out the others. At the end of the hall is the exit door. It's still not too late to leave (after all, everyone gets nervous on the first day).

You reach for the last door on the right and click on the door with the mouse. As you go into the room, you see a patient in bed. You pick up the hospital clipboard (isn't that what doctors usually do in the movies?) and learn that this particular patient is female (you had figured out that much on your own), 32 years old, and complaining of acute abdominal pain accompanied by nausea, cramping, generalized weakness, and dizziness. It sounds serious, and you're only a resident.

As you use the mouse to click on an area outside the clipboard, you're once again looking at the room. Click on the patient and you'll see a closeup of her stomach. As you click on her bare stomach, you'll hear digitized cries of pain—*Yow!*, *Oooog!*, *Yipes!*, and *Ouch!* (they sound pretty realistic, too—at least for IBM digitized sounds).

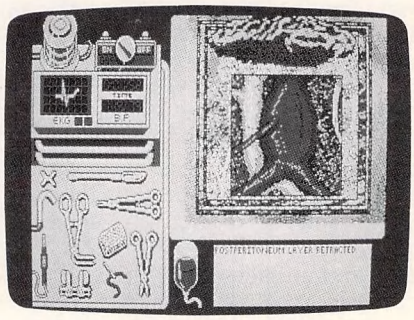
For some reason, you can't seem to recall any of your studies from medical school. Fortunately, you received a packet of printouts from Dr. Lindstrom. These list medical conditions you may run into, their treatment, and basic surgical techniques. All you have to do is make a match. You decide on intestinal gas, which requires only an observation and bed rest. You check on the clipboard that you've completed the observation and sign your initials, and—uh, oh—Dr. Lindstrom appears, big as life, and says your diagnosis is incorrect. That's four years of medical school and tens of thousands of dollars down the drain.

You work your way to the classroom, where Dr. Lindstrom goes over your first diagnosis. He tells you (and the class) that the patient's pain was not localized. (You should have known this because, no matter where you clicked on the patient's stomach, you heard cries of pain). This indicated a bacterial infection, which requires medication. (Yes, it was all there in the literature from Dr. Lindstrom.) That's when you realize that *Life & Death* will take more than the usual amount of concentration and dedication.

More Patients

As you see more patients, you'll be able to use the hospital's state-of-the-art x-ray machine and Ultrasonic Scan (the Ultra Viewer 7000) to help you sort through your patients' complaints. You can use the intercom (available in any room except the OR) to access the Hospital Policies and Guidelines clipboard. From that clipboard, you can put quiet hours in effect (no sound effects), choose joystick or mouse (the keyboard is always available), select the difficulty level (Novice, Intermediate, or Advanced), or remove a surgeon from the sign-up (this is the best way to get rid of your less-than-distinguished career record). On the Hospital Guidelines and Policies clipboard, you can check one of three levels (Novice Level, Intermediate Level, or Advanced Level). No matter which of the three levels is selected, when you switch on Nightmare mode, the advanced level will automatically be checked.

You're free to wander around the hospital. Just move the onscreen arrow (with the mouse, joystick, or cursor keys) and click on a door (using the mouse/joystick button or the Enter key). In the Staff Room, you'll see a filing cabinet with the *Life & Death* Honor Roll, a list of top surgeons (something to work toward). You'll also see the personnel nurse, who has a folder with the six staff members available for the operating team. From the six, you choose only two. When you click near a name, you'll see that staff member's photo and profile. Each doctor has an area of speciality and may dislike or work well with another doctor. You'll have to choose the two staff members by balancing their ability to work together with their expertise in your patient's condition.



You're the heart surgeon in Life & Death.

When passing through the main hall, Nurse Pierce occasionally gives you a message that someone has called. Use the cardboard beeper, included with the game, to line up the name of the person who's calling, the location from which the caller is calling, and the number of the phone line. As you may have guessed, this is how *Life & Death* is copy-protected. (The disk itself isn't protected, but the game requires that you have and use your beeper.)

Once you've lined up the see-through boxes, the beeper will show you the number to dial on the telephone. Click on the phone and either click the appropriate touch-tone buttons or type the numbers from your computer's keyboard. You'll then receive a useless reply from the person who called, such as *Don't forget our meeting on Thursday.*

Knife Work

Of course, the real glory work (or gory work) of the profession is done in surgery—something you'll have to face sooner or later in *Life & Death.*

Once you've diagnosed a condition that requires surgery, such as appendicitis, it's on to the OR. Even though you'll be helped by your surgical team, it's your responsibility to constantly monitor the patient's vital signs. You should study the printed material from Dr. Lindstrom so that you're familiar with the necessary medical devices and instruments.

The devices include an EKG, which monitors PVC (Premature Ventricular Contraction) and bradycardia; blood pressure gauge; surgical clock; IV bottle; and anesthetic dial. The surgical

instruments include a cauterizer, clamp, dacron graft, forceps, retractors, scalpel, scissors, skin clips, suction, and sutures.

As you can see, surgery can be pretty involved, even in a computer game. If things don't go just as they should, you'll know soon enough: Your patient will die on the table, just as in real life. After an unsuccessful operation, you go back to class for an analysis of your mistakes (which can include a "videotape" or "slide" of the operation. Don't take your failures too seriously; there's an endless supply of patients on which you can practice.

FAST FACTS

Title:	*Life & Death*
Category:	Medical simulation game
Features:	Multiple players; three difficulty levels; realistic simulation of surgery
Requirements:	IBM, Tandy, or compatible PC; 512K; DOS 2.0 or higher; CGA, EGA, or VGA graphics adapter
Publisher:	The Software Toolworks One Toolworks Plaza 13557 Ventura Blvd. Sherman Oaks, CA 91423
Price:	$49.95

Lab Report: Excellent Health

Life & Death has better-than-average graphics for a CGA-based game (it was originally developed for the Amiga). It's especially easy to use with a mouse. Along with the game disks (both 3½- and 5¼-inch), you receive the printed support material from Dr. Lindstrom and an informative booklet on the history of surgery. Oh, yes—you also get a pair of latex medical gloves and a surgical mask (now you're covered for Halloween).

Life & Death does require some thinking on your part, but it has a good sense of humor, and it actually teaches you something as you learn to play. This lab gives *Life & Death* a clean bill of health—it's in excellent shape and should have a long and prosperous life.

Home Finance System III

Glenda McClure

With *Home Finance System III* claiming to make and save money, I half expected a lesson in computerized counterfeiting. Instead, I found a reliable program capable of managing my finances by tracking my income and expenses, balancing my checkbook, writing reports, and printing checks.

Tracking Income and Expenses

Home Finance System (HFS) monitors financial transactions for as many as 100 asset accounts, including certificates of deposit, savings accounts, and checking accounts. It also tracks up to 100 credit accounts, including credit cards, loans, cash, and utilities. Account balances can range from $20,000,000 to −$20,000,000. (That's *minus* 20 million dollars.)

You can assign a use/source code to income and expenses such as food, gas, mortgage, rental income, or interest earned. You can also easily delete any code not applicable to your finances or add codes that are. The program allows as many as 100 codes with a maximum of 19 characters each. In addition, you can break down an expense into as many as 14 different categories, each with a separate tax flag, such as *T* for *tax-deductible*, *M* for *medical*, or *O* for *other*. This feature is especially handy for itemizing credit card purchases.

Balancing the Checkbook

To balance your checkbook, *HFS* first reconciles your checking account; then you compare its balance with your bank statement. After you've entered the present bank balance and recorded each of your canceled checks, the program computes a trial balance that should agree with the bank balance. If it doesn't, the Balance Assist menu has 11 routines to help you find your reconciliation error. For example, Display Ret'd Checks lists returned checks so that you can verify their accuracy. Another routine, Temporary Exit, allows you to leave the balance process temporarily to add new entries or change any incorrect items.

Writing Financial Reports

Reports are printouts of your accounts and their transactions. The Asset Checking Acct List offers categories called All Transactions, Expense Transactions, or Deposit Transactions. The Code Summary lists the amount and percentage spent on specific items during the month or the year.

There is a problem with the way *HFS* handles its reports: The program doesn't let you view your reports on the screen—you must print them. This is probably why *HFS* recommends that you have two printers, one with blank paper for reports and the other for checks. Pressing Shift-F8 switches quickly between the two printers.

Printing Checks

Each checking account can have up to three files, allowing you and your spouse to carry separate checkbooks, and the computer, in effect, to have its own checkbook. Files 1 and 2 hold information about handwritten checks; the third file allows the computer to print its own checks.

You enter all the checks to be printed, and the system prints the entire batch—thus the need for continuous-feed checks. You can also design up to three check formats that specify where addresses and comments will appear on the check. Unfortunately, checkbook stubs are not updated as the checks are printed, forcing you to boot *HFS* each time you want to see your checking-account balance.

The manual provides detailed instructions and prices for ordering continuous-feed checks. The price for 500 checks is $42.95; 500 double-window envelopes cost $63.95.

The manual warns that computer checks may not work with your bank's automatic check-reading equipment. Because *HFS* prints the check number, you will not have the magnetically encoded characters on the check. As a result, the equipment at your bank won't be able to report the check numbers on your canceled checks. The bank will have to return your canceled checks so you can manually identify them.

Other Features

One handy feature is a screen saver. It blanks the monitor after a specified number of minutes of keyboard inactivity. You can press any key and the screen turns back on.

There is also a password feature that assures the safety of your accounts; however, once you've selected the option, you'll need to remember your password. If you forget it, you won't be able to run *HFS*. Another useful feature is a handy pop-up calculator that helps with addition and subtraction.

FAST FACTS

Title:	*Home Finance System III*, version 3.11
Category:	Financial management software
Features:	Tracks income and expenses, balances checkbooks, writes reports, and prints checks
Requirements:	IBM, Tandy, Zenith 100, or compatible PC; two disk drives; color or monochrome monitor; wide-carriage printer or one capable of printing 132 columns in compressed mode
Publisher:	Jay Gold Software P.O. Box 2024 Des Moines, IA 50310
Price:	$99.00

Learning Curves

I had a problem getting started in *HFS*; I couldn't figure out how to enter account transactions. At the end of two frustrating hours, I realized that the manual doesn't have a picture of the Main Menu. Even though the manual refers to the Main Menu and shows all the other menus, there's no picture of the Main Menu.

The program's unfamiliar abbreviations also slowed me down. The manual and screen refer to the function keys as 1–10, not F1–F10. Shifted function keys are S1–S10, not Shift-F1–Shift-F10. Also, *mnu on* is *menu on*. Why not just spell out menu? *IC* is the abbreviation for insert mode. *Current bal before tx* is *Current balance before transactions*, not *taxes*. These abbreviations were puzzling enough to send me back again and again to the manual.

On the plus side, once I figured out the Main Menu mystery, the program ran smoothly. There are a lot of menus, and help boxes appear in the lower right corner of the screen. Also, pressing Escape gets you out of any problem and back to the Main Menu. The 150-page manual is helpful and written in easy-to-understand English, and a five-page, two-column index provides a quick reference for questions. I appreciated the manual's honesty in warning about potential problems that might catch the user.

With three revisions to its name, *HFS* is confident enough to deliver more than it advertises. It's a bug-free, mature program that completely tracks your finances.

After you've memorized the abbreviations and learned your way around *HFS*'s style, you'll have a reliable program at your fingertips. And if you do need some hand-holding, *Home Finance System* offers telephone support.

Spreadsheet Utilities

Steve Hudson

Spreadsheets: We love 'em and we hate 'em—often for the same reasons.

With a spreadsheet, you can make many revisions—but which revision is which? You can manipulate piles of data—but the data can quickly become too big to manage. And spreadsheets can free your mind for thinking—but what do you do about ideas that flash by in the middle of a budget calculation?

The folks at Simon and Schuster Software apparently have experienced the same problems. As a result, they've released four utilities for use with *Lotus 1-2-3* Release 1A and 2.

These utilities, called *Check It Out, Rescue Me, Tight'n Up,* and *Jot It Down,* are designed to smooth the way to spreadsheet heaven. They let you compare spreadsheets, deal with damaged files, compress spreadsheet files, and even stop in the middle of a spreadsheet operation to record that once-in-a-lifetime thought.

And they do it all remarkably well.

Check It Out

Check It Out is for people who manage to lose track of their spreadsheet revisions. Basically, it compares two spreadsheets and pinpoints the differences between them. You specify the files you want to compare; *Check It Out* then gives you a variety of reports outlining the differences between them. You can compare entire files or a specified range of cells.

The program provides five different report options. With one option, you can identify and compare the program (and version) used to create each of the spreadsheets. You can compare calculation modes, orders, iteration counts, and protection status. You can also compare the differences in print and label formatting, printer setup instructions, and headers and footers.

Other report options include Named Graph Differences, which produces a report comparing the two spreadsheets' graphs, and Range Name Differences, which identifies the range names not common to both spreadsheets and lists the cells comprising the ranges. Two other reports—Cell Differences (Summary) and Cell Differences (Full Report)—let you identify the differences between the spreadsheets' cell labels, formulas, numbers, and calculated values, with the full report providing the most detailed information. You can direct the output for any of the reports to either the screen or a printer.

You'll find many uses for *Check It Out*. For example, you're developing a spreadsheet template to track the promotional expenses for your family business. After working and reworking your spreadsheet, you notice you have too many versions to keep track of. How can you easily determine the differences between version 12 and version 26? *Check It Out* will pinpoint the differences, making it much easier to follow your revisions. You can even use it when revising existing spreadsheets, to make sure that the changes you end up with are the ones you had in mind.

Check It Out includes an interesting utility called Tree Walker, which sim-

plifies the job of locating particular directories and files. It allows you to view a list of all the files in a directory. A single keystroke loads the desired files for checking.

The program also provides context-sensitive help, although it's not really needed.

Rescue Me

OK—so you've never gotten mixed up about which revision is which. But have you ever come face-to-face with a damaged spreadsheet that won't load—making it unusable? Aha! Then you've needed a utility like *Rescue Me.*

Rescue Me works on the principle that spreadsheet programs expect to find their information in a particular format. *Rescue Me* examines damaged files byte by byte to locate any information that is not in the right format. It then uses its built-in pattern-matching routines to reconstruct the wounded portions of the spreadsheet. Repairable cells are restored; unrepairable cells are identified and located. When the rescue is complete, you should be able to reload your spreadsheet and repair any remaining damage yourself.

The operation is straightforward. First, you specify the name of the damaged file and where you want to save the restored file. Then, you choose one of three repair modes. Mode 1, which checks every cell in the spreadsheet, leaves the maximum amount of data intact.

Mode 2, generally reserved for cases of more severe damage, starts by eliminating all the spreadsheet settings. It considers only labels and data cells and accepts a cell only if the neighboring cells are undamaged. After using mode 2, you'll need to respecify the deleted settings.

Mode 3 is the Arnold Schwarzenegger of spreadsheet repair. It incorporates the procedures of both mode 1 and mode 2, in addition to removing any duplicate cells. Like strong medicine, it also has the most side effects. In cases of extreme damage, though, it's nice to have mode 3 in reserve.

The manual's explanation of the inner workings of *Rescue Me* is not very detailed. That may intimidate some users. Fortunately, you don't need to understand the nuts and bolts of the machinery to use *Rescue Me.* The program works quite well on its own.

Rescue Me reports on itself, too. The Cells Rescued report pinpoints which cells were restored, what type of cells they were, and the content and format of the cells. If *Rescue Me* cannot fully restore a cell, it marks the cell for you—in some cases even indicating what may be wrong. That's a real help when you have to finish the repair work yourself; it's one of the great strengths of this utility.

Like *Check It Out, Rescue Me* includes the Tree Walker utility and provides context-sensitive help.

FAST FACTS

Title:	*Check It Out, Rescue Me, Tight'n Up,* and *Jot It Down*
Category:	Spreadsheet utilities
Features:	Compare differences between spreadsheets; repair damaged spreadsheets; attach notes to spreadsheet cells; compress files
Requirements:	IBM, Tandy, or compatible PC; DOS 2.0 or higher; any program that produces *Lotus 1-2-3*–compatible WKS or WK1 files.
Publisher:	Simon and Schuster Software One Gulf + Western Plaza New York, NY 10023
Price:	$29.95 each

Jot It Down

Have you ever needed to attach a note or an explanation to a particular spreadsheet cell? Perhaps you've wanted to include an explanation of the differences between SALES1.WK1 and SALES2.WK1. Or maybe, in the middle of working up a spreadsheet budget, a brilliant but fleeting idea came to you—and you needed to write it down right away.

Jot It Down lets you do all of that and more. It's a memory-resident utility that allows you to attach notes to any cell in a spreadsheet, to any particular spreadsheet file, or to any directory. Essentially, it's a bare-bones pop-up word processor that you can access at the touch of a key.

Using *Jot It Down* is straightforward. With the utility loaded in RAM and your spreadsheet on the screen, you call *Jot It Down*'s memo window by pressing a hot-key combination (the default is Alt-F1, though you can choose your own combination). Then you simply type in your memo or message. It's saved to the disk when you next save your spreadsheet.

In addition to creating memos, you can also manipulate them. *Jot It Down* lets you recall and edit existing memos; copy, move, or delete existing memos; and print memos to your printer or to a file. The utility even prints a list of all of the cells that contain memos. You can sort the memo-bearing cells by row, column, or date, as well as by the value of the cell itself.

One especially useful feature of *Jot It Down* is its ability to search through the memos to locate particular words or phrases. It can search for strings up to 35 characters long. Each matching memo is displayed on the screen, where you can also edit it.

If you're using your spreadsheet to provide total cost estimates to your customers, the total cost may be based on the postage rates that you've built into some of your formulas. With *Jot It Down,* you might attach an appropriate comment (for instance, POSTAGE DEPENDENT) to the cells containing those formulas. Then, the next time postage rates change, you can use the search capability to locate each of those cells for an easy updating of the numbers.

Jot It Down also includes the Tree Walker utility. No help is available, but none is really needed.

Tight'n Up

Tight'n Up is a memory-resident utility that lets you reduce the size of spreadsheet files by as much as 90 percent—a figure that can translate into a lot of extra space on your hard disk. You can also use *Tight'n Up* as a stand-alone program for compressing other types of files.

Tight'n Up doesn't overwrite the uncompressed files. Instead, it creates new files with a slightly different ex-

tender (for example, WK$ instead of WKS, or WK! instead of WK1). The compressed files can be saved and retrieved much faster than uncompressed files—in addition to their taking up much less space on your disk.

Tight'n Up is more than just a spreadsheet utility. It can also function as a stand-alone utility for compressing files from other applications, including word processors and database managers.

It's easy to compress a spreadsheet file with *Tight'n Up*. With the utility in RAM and your spreadsheet up and running, press Alt-1 (or another hot key, if you've changed the default). This will bring *Tight'n Up*'s main menu to the screen. Then pick the desired file-compression option. You can choose whether or not to save the actual calculated values (the formulas are always saved). You can also indicate how the blank cells should be saved when the file is compressed.

Tight'n Up also lets you add password protection. Your password can be up to 15 characters long. To be sure that the password is set up correctly, the program asks you to enter it twice.

Tight'n Up automatically decompresses files when it loads them. If you've included password protection, the file will not be loaded until the correct password is entered. When you've finished with *Tight'n Up*, press Esc to return to your spreadsheet.

To use *Tight'n Up* as a stand-alone application, first load it as you would any application. Then specify the file you want to compress and the destination file's name. Here, too, you have the option of including password protection. If you're using it as a stand-alone program with spreadsheet files, you'll also see the options for saving calculated values and dealing with blanks, as noted above.

Tight'n Up is remarkably easy to use, with context-sensitive help where you're likely to need it. Even so, there may be a bit of confusion when it comes to setting the blanks and values options. Setting the values option to ON tells the program not to save the values themselves. This seems backward; OFF would be a more logical setting for that particular result. There's a similar logical flip-flop with the blanks option. But you do eventually get used to it, and the instruction booklet, while short, is fairly clear.

Final Analysis

Simon and Schuster's four spreadsheet utilities are useful and inexpensive. They're not copy protected, allowing you to easily make backups, and the package contains both 5¼- and 3½-inch disks.

The manuals, while not elaborate, do cover the key points of operating the program. Program installation, loading, and operation are described clearly. The help feature in three of the four packages is comforting to have, though you probably won't need it after your first few sessions. As a last resort, Simon and Schuster also has a number you can call for technical assistance—but if you're comfortable loading and using spreadsheets, these utilities should be a breeze.

4 × 4 Off-Road Racing

Tom Campbell

Tired of your ten-year-old subcompact? Looking for a little excitement? *4 × 4 Off-Road Racing* gives you a chance to drive a long, rough course, equipped with limited fuel and spare parts and precious few other resources.

You begin by entering 4x4 at the DOS prompt. After verification, you'll hear an obnoxious theme and see the title screen. The sound is OK, but I've heard far more creative use of the PC's (admittedly limited) sound capabilities. Press the fire button (or its keyboard equivalent, the Ins key) to move on to the next screen, which asks you what kind of video configuration you have: CGA, Hercules, EGA, or PCjr/Tandy 1000. (A good programmer could have written the software to detect the graphics adapter. The startup code should do this and present its best guess as the default choice.)

The use of color is quite good, but I have a beef with the resolution: 320 × 200 is used even on the Hercules. While this makes life a great deal easier for the programmer, the user pays $39 for less than full use of the Hercules' high resolution (which is almost twice that of the CGA).

After you've chosen a display, you select from four terrains and four skill levels. The terrains include Baja, California, and Death Valley (both desert areas, which appear the same when you're driving), Georgia (for a muddier drive), and Michigan (for snow). They're pretty much identical, but more on that later. With the easiest skill level, you can choose a truck and jump right into the game, but it means you'll miss out on some fun.

Shopping for Your Wheels

You have a choice of four trucks. Each is shown on its own screen with the truck pictured above a spec sheet showing the truck's horsepower, height, endurance, and so on. The trucks are given mythical company names, like Cox Motors and Venerable Motors (even though the package comes with some Kawasaki brochures). I really couldn't tell any difference in driving the trucks, although they range from the 225-horsepower Highlander to the 113-horse Katana.

Next, if you choose any but the first skill level, you'll visit a couple of stores. First you'll go to the Custom Shop, where you can purchase your heavy equipment, such as a winch and tires. Keep in mind that you have a limited budget and payload. Next you'll drop into the Auto Mart, where you can pick up anything from water to spare parts to a mechanic (pictured as a monkey—get it, grease monkey?—in overalls). Your budget and carrying capacity decrease with each item selected.

Then you start the race.

You Can't Go Off-Road!

When the flag drops, you'll find yourself driving in a nearly pristine landscape. The only litter you see is in front of your truck, and there's enough of it to make you wonder if a garbage scow from New York has somehow found its way to the desert. What's most interesting is the road itself, which is clearly marked by dotted lines at all times. In *4 × 4 Off-Road Racing*, you can't go off-road! The dotted lines limit your lateral motion so that you're effectively driv-

ing on a litter-strewn, two-lane highway. Somehow, this seems a teensy bit contrary to the no-holds-barred, rough-riding, anything-goes free-for-all suggested by the game's title.

Frankly, the terrains are all very much alike. As the starting flag drops, you're apparently alone, in marked contrast to the chaotic start of a real race. You see no tents, no registration area, no other vehicles, no beer-swilling spectators, no mascots. It's just you and the man with the checkered flag. While this may be an unfair criticism of the game, I miss the excitement and camaraderie of the start of a race, which makes it something of a social occasion.

FAST FACTS

Title:	*4 × 4 Off-Road Racing*
Category:	Racing simulation
Features:	Four trucks, four terrains, and four skill levels; runs well at any computer speed
Requirements:	IBM, Tandy, or compatible PC; 256K; DOS 2.0 or higher; CGA or Hercules required; joystick optional
Publisher:	Epyx 600 Galveston Dr. Redwood City, CA 94063
Price:	$39.95

There aren't too many other drivers on the road, which robs players of another source of excitement. When other racers do come, it's a sudden and welcome break. The other drivers are typically fast but not very aggressive, so it's not too hard to pass them. You'd better pass them, too, because your goal is to beat them to the finish line. Besides, it's humiliating to eat the dust of a competitor, especially when the other car appears to be puny and far less capable than yours. The manual warns you of the Doombuggy, claiming you'll recognize it right away—but you won't if you're using a monochrome system. The Doombuggy is a brutal, nasty road hog and apparently can't be passed.

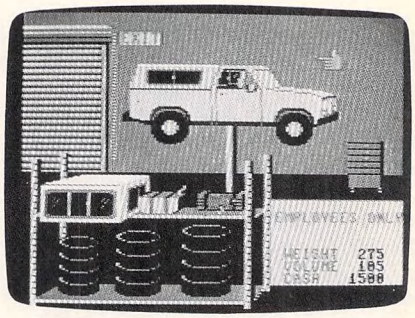
If you pause to repair damages, you can look at a map. Each map is distinct, but driving in snowy Michigan is disappointingly similar to driving in furnacelike Death Valley. The same mountain range rims the horizon of each terrain. Worse, the designers missed some key features of each terrain. For example, there are no ice slicks or snow banks in Michigan, and the truck doesn't seem to overheat in Death Valley any more than it would in Georgia. Even the junk in the road varies only slightly. All the terrains have rocks, crates, and old tires in the road; the desert landscapes add cow skulls and (gulp!) grisly-looking human skeletons. Driving over a cow skull will flip the truck end over end, whereas a tire or a box will usually only tip it up onto two wheels.

Damage Control

Invariably, you plow into objects while trying to keep track of the dashboard or because of the lag in response time, and you build up damage to your truck. Instruments on the dashboard change color to warn you of this (warnings are also visible on monochrome systems). Eventually you're pulled aside to make repairs, if you don't pull aside yourself. You can stop for repairs voluntarily by pressing the space bar.

The Damages Screen shows a picture of the truck in the top window with a hand icon waiting by its side. Indicators of the truck's damage appear around it: An oil leak shows a pool of oil accumulated under the truck, a lightning bolt shows electrical damage, and so on. To assess the damages, you move the hand icon to the appropriate indicator and press Fire (or the Ins key). A description window tells you what's needed. You then move the pointer to the windows at the right, where you'll see the parts. Press Fire to select the needed parts, and the description window is updated with a figure indicating the time required to make the repair.

I wish my mechanic could see some of the repair times listed on the Damages Screen. How about 31 minutes for electrical work? To be fair, they seem about right for a road race. Repairs, appropriately enough, take effect when you point at a sledgehammer tool. You'll want to do all this as fast as you can, as you're running against the clock. When you've completed all of your repairs, a checkered flag appears and you can take off again. You may want to check the map before reentering the race, but it does consume precious minutes.



Get ready to hit the road in 4 x 4.

How Fast Is Fast?

On a floppy-based system, the performance is very good. The pauses between segments of the game (such as when you're pulling off the road to repair damages) are never distracting. Performance on a standard 4.77-MHz PC was about the same as on a 20-MHz 80386. While the screen regeneration isn't as smooth as it is on the games in the arcades, it's quite fast—even on a pokey PC. I was impressed.

I was surprised that mouse control isn't supported. I don't have a joystick, but keyboard control is very good. You can freeze the game with Alt-P and toggle the sound with the S key, but there's no way to save a game in progress to disk.

You can copy *4 × 4 Off-Road Racing* onto a fixed or floppy disk. There aren't any funky hidden files or jimmied disk sectors, but you'll have to insert the original for verification at the start of each game. For copy protection, this is pretty painless, and I didn't find it to be a problem. I'm paranoid about floppies going bad, but the verification scheme never writes to the original for confirmation, so I was able to put a write-protect tab on the disk.

The manual is extremely short and a little too terse for my liking, but I suspect most gamesters will be able to learn the basics with only a glance at the supplemental Keyboard Command Card.

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If you don't expect 4 × 4 *Off-Road Racing* to be a ground version of *Flight Simulator* 3.0, you'll probably enjoy it. Although I'd like to see more realistic details in each terrain setting, I liked the chance the game gave me to ditch my everyday car, jump into a 4 × 4, and hit the road.

Ultima V: Warriors of Destiny

James V. Trunzo

When you open the *Ultima V* box, you discover the now-familiar tapestrylike cloth map, the standard *Book of Lore*, and the typical fistful of disks. Then you wonder: *What could possibly be new and different about a program that's in its fifth rendition?*

Actually, quite a bit.

Ultima V continues the story line of its immediate predecessor, *Ultima IV*, in which the main character (your persona) achieved the exalted state of Avatarhood. Now your talents are sorely needed because the wise and benevolent ruler of Britannia, Lord British, has vanished while exploring a newly discovered underworld. The country has fallen under the sway of Blackthorn, a once-respected nobleman whose fanaticism and ambition have transformed him into a cruel and merciless tyrant.

An Avatar is needed to discover the fate of Lord British and to take the throne from the self-righteous dictator, Blackthorn. You've been summoned to help in this just cause.

It's a *Big* World

It won't be easy. Accomplishing the objectives of this adventure is no small feat, and *Ultima V* is no small game. Requiring anywhere from 150 to 200 hours to complete, *Ultima V* is a full 33-percent larger than *Ultima IV*. You'll need to explore more than 30 multilevel villages, towns, castles, and keeps. An equally imposing underworld promises to challenge even veteran adventurers.

While bigger is not necessarily better, Britannia's larger population improves the game. It's also consistent with the goals of Richard Garriott, the creator of the Ultima series. Garriott's ultimate goal is to create an adventure world that's as believable as possible. Many of the new enhancements, including the added villages and towns, are designed to strengthen the feeling of realism. After all, a real kingdom should have more than just a magnificent castle and dangerous dungeons. This kingdom has much more.

Casting a spell in Ultima V.

You'll find that Britannia's townsfolk and villagers work during the day and sleep at night. Stores also open and close according to the time of day. Fortified towns and castles raise their drawbridges and drop their portcullises to protect the people within. All of these elements force the player to be aware of the often ignored aspects of working and eating and sleeping. To succeed at *Ultima V*, you must become immersed in the reality of day-to-day existence in Britannia. If you don't, you risk finding yourself in need of sanctuary when the gates are locked, desperate for supplies when the stores are closed, or in need of healing when the doctors are asleep.

Another element in *Ultima V* that's an improvement over its predecessors is the depth of interaction with the Non-Playing Characters. No other facet of the game is as important as communicating with the literally hundreds of NPCs. You'll find that the NPCs in *Ultima V* are more intelligent than ever before.

The inhabitants of Britannia also possess larger resource files, enabling them to carry on sophisticated conversations (sophisticated, that is, when compared with those of similar characters in other adventure games). Where an NPC might have delivered only one line of dialogue in a previous game—giving only a single clue or bit of information—characters in *Ultima V* can "speak" three or four sentences. Again, the depth of the conversation contributes to the overall effect of being in a real world.

Graphics Feast

The vastly improved graphics will surprise and delight previous Ultima players. While *Ultima V* automatically defaults to the graphics capability of your system, the game cries out for EGA resolution. Small visual details help complete the illusion that Garriott is working to create. These details range from ticking clocks and gurgling fountains to playable harpsichords and lighthouses whose animated beams pierce the darkness of night. Colors and shading accentuate each icon, whether the icon is a person or a bookshelf; in combat, hurling an ax no longer looks the same as casting a ball of fire.

Speaking of combat and realism, *Ultima V* takes a big stride forward in its presentation of battle. Not only do the graphics more accurately depict what's taking place, but the combat system allows for more advanced strategy and tactics.

Previously, attacks had to be car-

FAST FACTS

Title:	*Ultima V: Warriors of Destiny*
Category:	Fantasy role-playing game
Features:	Detailed cities; intelligent computer characters; evolution of Ultima story line
Requirements:	IBM, Tandy, or compatible computer; 256K of memory; DOS 2.0 or higher; CGA and EGA supported
Publisher:	Origin Systems 136 Harvey Rd. Building B Londonderry, NH 03053
Price:	$59.95

ried out on linear paths, with targets directly in line with the attacker. *Ultima V* allows your character to attack anyone within range, regardless of the angle; and the targeting system is both simple and effective. Of course, the improved flexibility in combat works both ways, making the wilderness and the dungeons even deadlier than before!

Be Your Best

Ultima V isn't only about hacking and slaying. Just as in *Ultima IV*, where virtues and ethics played a crucial role in your becoming an Avatar, *Ultima V* demands that you maintain those same qualities now that you are an Avatar. Should you stray too far from such qualities as honesty, humility, and charity, you won't receive the information needed to finish the game.

The program remembers your response to each situation and judges you accordingly. Steal too often or ignore the cries for help from those less fortunate, and expect a visit from a spectral being who will remind you of your noble calling. Good deeds allow you to redeem yourself if you should stray too far from the path of the Avatar. At least in this aspect, the program is somewhat forgiving. Incidentally, such underlying themes help to elevate the level of adventure games and represent an attempt to teach without moralizing.

Obviously, someone who has played the Ultima games before, especially *Ultima IV*, has an advantage over a newcomer to the series. Apart from the player's experience of the game, veterans can bring their characters from *Ultima IV* directly into *Ultima V*. While previous Ultima experience isn't required to play and enjoy *Ultima V*, I wouldn't recommend this product for fledgling adventurers.

The game is difficult (though fair) and can be frustrating during the early stages, when it isn't so obvious who should be asked which questions. The sheer number of hours needed to complete the adventure requires a commitment that newcomers to the genre might not be willing to make.

The program is distributed on 5¼-inch floppies, but you can obtain 3½-inch disks from Origin Systems. You can install the game on your hard disk, but you'll need the key disk to boot the program.

A few final notes for novices and Ultima veterans alike: Be sure to read all of the excellent documentation, especially the daily log. It contains useful hints on how to deal with some of the monsters you'll encounter. Also, as the result of an effort to motivate you and involve you in the story line, be prepared to lose a close friend early in the game to the cruelty of Blackthorn. You may well find that this really works and that you do feel genuine loss, anger, and a drive for revenge.

Ultima V isn't just another sequel, resting on the laurels of what has come before. It's a real improvement over earlier versions, and it advances the art of computer adventuring. *Ultima V* is highly recommended for those who enjoy adventure games.

Firezone

Keith Ferrell

For a long time, I've wanted a serious war game that I could play in an hour or so. *Firezone* is it.

This simple yet elegant and sophisticated war game supposes a strife-torn world a few decades from now. According to *Firezone*'s scenario, the intervening decades have seen little progress on the diplomatic front: The world has collapsed into a few heavily armed camps that are constantly at each other's throats. *Firezone* focuses on two of those powers, the European League and the Pacific Combine.

Politics are not all that have changed. Technological progress has brought superweapons that have redefined ground combat, and this is where the programmers have concentrated the game's action. Despite the superweapons, foot soldiers have a part to play; *Firezone*'s infantry forces are equipped with lasers and powered armor.

Tomorrow's Tanks

The big guns, however, are what dominate the fields of combat in *Firezone*'s future. The game's designers have carefully assembled an arsenal of armored vehicles to populate—or depopulate, actually—their battles. Grav tanks are able to rise above the ground, passing over any terrain at high speed; they have the longest range of movement of any of the elements in *Firezone*. The artillery is represented by Nova guns that can lob shells a long distance, but whose movement is restricted to a space or two each turn. Heavy tanks live up to their name, being slow and cumbersome, but they pack a solid combat punch.

Use tomorrow's weapons today in Firezone.

The most futuristic of the game's weapons are the Striders and the Leviathans. The Striders are borrowed pretty much in whole from *Star Wars:* They're bipedal walking weapons perfect for dislodging dug-in infantry. The Leviathans are supertanks capable of wiping out whole squads with a single pulse of fire.

The array of weapons is well suited to *Firezone*'s goals: There are enough different units to make the battle interesting, but not so many that you'll spend more time in setup than in action. *Firezone*'s emphasis is on combat, and its weapons, scenario, and command interface are designed to get you there quickly.

This is, in fact, a quick game on all counts, and that's one of the things I like best about *Firezone*. The scenario and game design work hand in hand to produce a satisfying strategic and tactical experience. It's an experience that neither gets bogged down in too much detail nor requires too much time. Also, you can play the game against a com-

puter opponent or another human player. The computer opponent is merciless, although it can be defeated.

Deadly Minutes

Battles are intense and brief in *Firezone*'s version of the future. Each turn in the game represents one minute of battlefield time, with turns alternating between sides. Even large-scale engagements rarely last more than half an hour of battle time. Because of the game's efficient interface, you can fight even large engagements in an hour or so of realtime.

Firezone is a keyboard-controlled game. While you can select some of the options with a mouse, you'll give most of the commands through the numeric keypad. The game is played in hexes, although the hexes don't appear on the screen. Six different icons represent the six types of combat units. An information window at the top of the screen keeps you informed of unit strength, available moves, and other pertinent information.

The screens themselves are attractive and easy to read. The terrain comes in several flavors: woods, marsh, cleared areas, cities, ruins, and water. Despite the sophistication of the weaponry, the terrain plays a major part in your success on the battlefield.

There are three modes during play. Movement lets you position your forces; Scan gives you a chance to scout the battle landscape; and Fire lets you discover, sometimes painfully, how well you've positioned your forces. You can also choose hidden or visible enemy units.

With *Firezone*, you can deploy your troops quickly, placing dozens of squads in only a few moments. The movement itself is accompanied by the sound of heavy machinery crushing everything in its path; the game sounds like a mechanized army on the go. If you're playing with visible enemy units, the enemy movement phase shows you each squad's strategy.

Fire!

With the troops in place, the firing begins. The firing sequence is randomly determined by the computer. Sometimes the sequence breaks in your favor; other times the enemy gets the first shot. When it's time for one of your squads to unleash its energy weapons, you can select the target. You must have a line of sight in order to fire, and the computer informs you if you've selected an ineligible target.

The computer also scores the effectiveness of your firepower and does so in a fair manner. I have never felt cheated by the outcome of a confrontation, although it took me a while to learn the effects of the various terrains on firing accuracy and damage.

Again, the game's premise and time scheme help to set the tone of the battle. A single minute's fighting can change the nature of the battlefield dramatically. Because so much firepower is concentrated in each of the game's units, the loss of a single squad can spell the difference between triumph and catastrophe. In some of the scenarios, reinforcements arrive at the beginning of a turn, which helps; unfortunately, the enemy also occasionally receives reinforcements.

Firezone comes with nine preset scenarios, ranging from quick-and-dirty raids and skirmishes to all-out warfare in the cities and wastelands with dozens of units. My personal preference is the Stalingrad II scenario, with its clash between two large forces which quickly reduce the urban setting to rubble.

Build Your Own

Nine scenarios may not be enough to satisfy your interest. To that end, the designers included Gamegen, a construction kit that lets you modify existing scenarios or build your own battle from the map up. Map design is easy to master, although design of the individual units could be explained more clearly in the documentation. PSS has thoughtfully included a layout sheet which can be photocopied to make game design more efficient.

For all the thought that went into the program's design, a few aspects of its documentation leave something to be desired. Images from the game are reproduced on several pages in the manual. They're included to instruct the reader, but the screen shots are poorly reproduced and hard to decipher. The manual also describes the terrain, but you won't see it there: You'll have to go to the computer and use the Scan mode to get a feel for each of the different types of landscapes in the game.

Another annoyance is the richness of the overall *Firezone* scenario. A narrative, a time line, and a two-page map all work to create the illusion of a complex future with several power blocs. Yet only two of the blocs are represented in the game itself. Perhaps PSS will produce some scenario disks that will complete the world of the future they've begun to create here.

A few other inconsistencies could be fixed. *Firezone* makes, of all things, effective use of the PC's circuitry and speaker, yet it offers no option for turning off the sound. I'd like to be able to play this game silently, especially late at night.

I'd also like to be able to speed up the enemy movement phase. Even in the Hidden Unit mode, the game cycles through each enemy unit's movement, complete with sound effects when each hex is crossed. While this lends a certain excitement to the game—you can hear the approach of the enemy even when you can't see it—it also takes time. In the large scenarios, that time seems to stretch out forever as enemy squads march their way toward you. Future editions should give players the chance to accelerate this phase of the game.

Overall, though, *Firezone* is an excellent war game. Its simplicity and the speed with which its scenarios unfold make it ideal for quick and intense action on the battlefields of the not-too-distant future. **PC**

FAST FACTS

Title:	*Firezone*
Category:	Science fiction war game
Features:	Nine predesigned scenarios; game generator for designing your own battles
Requirements:	IBM, Tandy, or compatible PC; 512K RAM; DOS 2.0 or higher; CGA or EGA graphics
Publisher:	PSS Distributed by Datasoft 19808 Nordhoff Pl. Chatsworth, CA 91311
Price:	$34.95

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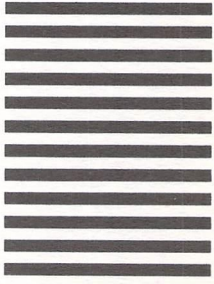

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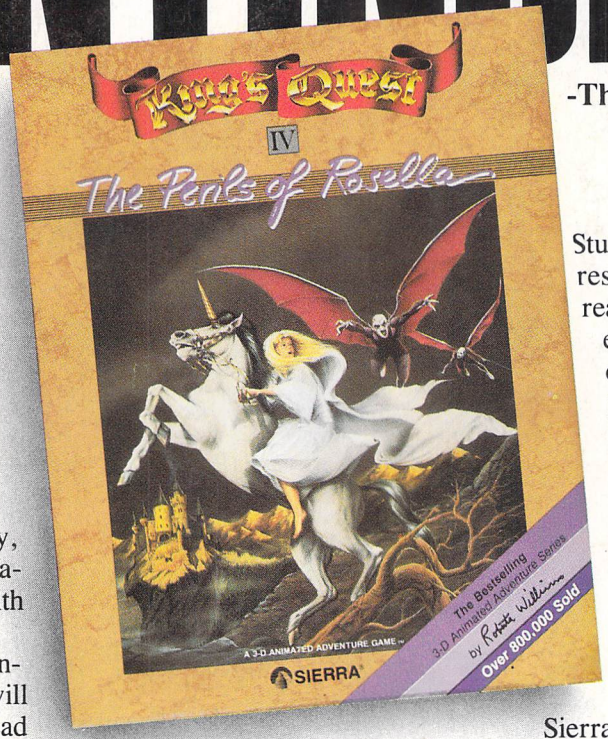

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